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Argentine Debts for Railway Equipment

AN important decision by the Argentine Treasury has been taken in the matter of the long-standing debts to British suppliers of railway equipment to Argentina. The Ministry of Transport Railway Purchasing Commission in London has been furnished with funds totalling 30,786,000 pesos. The necessary Decree by the Argentine Government authorising its Treasury to furnish the funds has been published in Buenos Aires. Messages from Argentina state that under the Decree the Commission may liquidate pending commitments for such purchases of equipment and material as have already been received in the country and are in use. The Decree also states that there is an accumulation of important pending commitments, which must be attended to without delay, together with those relating to other purchases and shipments due to be effected up to the end of this year. The importance of maintaining constant supplies of this kind of equipment is emphasised and the Decree also points out that they are such as cannot be substituted by other types or obtained from any other country. It is not clear what rate of exchange will apply to the remittance, but *The Financial Times* suggests that the sterling total involved may be about £1,500,000 in view of the preferential rates which usually apply to Government purchases. This amount would be well short of the general estimate of Argentine arrears on account of railway equipment deliveries to business undertakings in this country. The decision to make exchange available to meet these debts will meet a long-standing problem which has beset British railway equipment manufacturers. Argentina has been recognised as an important and valuable market, but grave difficulties have been experienced in conducting trade, because of uncertainties as to payment. The needs of Argentina for large supplies of railway equipment of all kinds to assist in the rehabilitation of its national transport system are well known, and there is no doubt of the willingness of British industry to co-operate fully in giving assistance to a railway system with which it has enjoyed long and friendly relations. Provided that reasonable facilities are provided by the Argentine Government for meeting its obligations, there should be good prospects of a resumption of useful and beneficial trade.

Increasing Steel Production

FOR some years record breaking outputs by the steel industry have been the rule. Last month, although output was affected by the normal holidays in the industry, the annual rate of production at 14,366,000 tons was 1,669,000 tons more than in the same month a year ago. The previous best July output was in 1940 when the rate was 13,145,000 tons. During the first half of the current year production was at the annual rate of 16,619,000 tons and therefore it would seem that the industry should have no difficulty in comfortably exceeding its target of 15,750,000 tons for the whole year. What impact the rearmament programme will have on the general demand for steel in the future remains to be seen. The steel industry is, fortunately, well placed to increase still further its production rate, and, with the stock position good, there is unlikely to be a renewal of distribution control for the time being. Extensive development plans begun after the war are now more than half way to completion and recently a number of new furnaces have come into operation. There is every chance that by 1953 the industry will be producing well over 17,000,000 tons a year.

British Railways and the Steel Industry

LINKS which have bound together the interests of British railways and the steel industry are as strong and varied today as they were a hundred years ago. This was a natural partnership, for each industry has been able to help the other. It is estimated that, altogether, something like 750,000 tons of steel are used for railway purposes annually. The large arrears of maintenance which accumulated during the war are making heavy demands on iron and steel and this demand will vary according to the speed with which these arrears can be put in hand and the restrictions which may be necessary because of national policy. An article in a recent issue of *Steel News* published by the British Iron & Steel Federation shows the extent to which the railways are dependent on steel. In order to maintain the railways of Britain in good condition it is necessary to renew about 2,000 miles of track each year in addition to post-war arrears and this means an annual consumption of 300,000 tons of steel. The permanent way of about 52,000 miles is equivalent to nearly 10,000,000 tons of steel and 20,000 locomotives average some 50 tons of steel each. Coaches, etc., numbering 57,000, many of which are all-steel, average about 20 tons each, while 1,400,000 wagons, many of which also are of steel, average 7 tons of steel each.

Threatened Strike on Canadian Railways

THE rejection by union representatives of the final offer made by the Canadian National and the Canadian Pacific Railways in the dispute over wages and hours makes it appear that only Government intervention can avert the threatened strike of 125,000 railway non-operating staff which has been called for August 22. A

similar strike was threatened in July, 1948, but was averted by a compromise which gave the employees a 17 cents an hour increase. In the present dispute the employees are demanding a five-day 40-hour week and a wage increase of 7 to 10 cents an hour. The final offer made by the C.N.R. and the C.P.R. provided for a 40-hour working week at some appropriate time; recognition by the unions in principle of ten amendments to existing contracts; and either a 44-hour basic week with a 9·1 per cent. increase to maintain earnings, or an average increase in basic wages of 8½ cents an hour. The dispute comes at a time when Canadian railways are having to meet increased operating costs which even record revenues fail to balance. Before precipitating a nation-wide strike the union leaders should ponder the words of Mr. Donald Gordon, President of the Canadian National Railways, that "the trade union movement has always suffered first when State control has replaced the democratic process." Moreover, the strike threatens, as Mr. Gordon warns, just when the country needs to devote all its energies and thoughts to meet the grave international situation.

Overseas Railway Traffics

THOUGH receipts of the Antofagasta (Chili) & Bolivia Railway this year have so far failed to maintain the 1949 level, there was a slight improvement during the fortnight ended August 6. Traffics for the first week were lower by £3,440 at £75,510, but were £9,200 higher at £68,880 in the following week, when a two-day holiday on the Bolivian section compared with a three-day holiday last year. At the end of 31 weeks Antofagasta aggregate receipts amounted to £1,887,554 and were £173,400 lower than for the equivalent period of 1949. During the first half of 1950 International of Central America operating revenues have advanced by $440,715 to $7,031,230 and net income is $237,964 higher at $864,071. There was a $25,456 setback in operating revenues for June and the resultant fall in net income amounted to $1,833 at $101,041. Gold Coast Railway traffics continued to improve during June with a £2,962 advance to £253,988 and at the end of 13 weeks aggregate receipts were £738,850, as compared with £705,777 last year. To give a true appreciation of the traffic receipts undistorted by fluctuating and often nominal exchange rates the Taltal Railway is in future publishing Chilean currency figures instead of sterling figures as heretofore. During July, Taltal traffics were $151,518 higher at $1,231,909.

Timetable Recovery Margins

THE practice of allowing additional time in train schedules over the last stage of a lengthy run for the recovery of time lost by exceptional circumstances has been developed in Great Britain since the war. Most London Midland Region expresses have 5 min. allowances of this kind on the final stages of their runs into Euston, Crewe, Carlisle, and Birmingham; the Eastern Region does much the same thing between London and Doncaster; but nothing of the kind is seen in Western, Southern, or North Eastern Region timetables. With the dense flow of traffic in Great Britain the concentration of a recovery margin in one brief stage of a journey has disadvantages as well as possible advantages. It is asking a great deal of human nature, for example, to expect the driver of, say, the "Tees-Tyne Pullman" to work his engine very hard from Kings Cross to Grantham, then to travel at much below normal speeds to Doncaster, and then to work harder than ever on to York and Darlington, because the timetable lays down a substantial recovery margin between Newark and Doncaster. On a recent run out of Euston, behind one of the powerful Pacific locomotives, starting 1 min. late we dropped a further 3 min. to Rugby, by noticeably slack uphill running, but the loss was easily recovered by the aid of the 5 min. recovery margin into Crewe. Yet for most of the journey the train had been running out of its scheduled path. Reduction of these margins might well make for more precise timekeeping generally.

A Tourist Industry in Pakistan

IN his presidential address to the Tourist & Publicity Bureau Conference in Karachi on July 26, Mr. F. M. Khan, Director-General of Railways, Pakistan, declared that his country was fully alive to the value of a tourist industry, but so far the pre-occupation of the State with other affairs had hampered efforts to establish it. Mr. Khan, who recalled the inception of organised tourism in India in 1926, when an Indian travel organisation was founded, emphasised that tourist publicity had to conform accurately to the relation of value for money on trust in accordance with commonly accepted principles. The North Western Railway had begun to encourage travel among Pakistanis, but up to now he had been diffident about extending activities abroad because, for various reasons beyond their control, they had not been sufficiently organised to offer travellers from overseas the services which they wished. Nevertheless, within two years they would have in service on the North Western Railway a considerable number of new coaches, including some equipped with air-conditioning, to meet the growing demand for improved facilities. The conference decided to set up a Pakistan Tourist Publicity & Information Bureau under the ægis of the Railway Division.

Abandonment of Ashover Light Railway

ALTHOUGH one of the most-recently built light railways in Great Britain, the Ashover Light Railway is the latest addition to the growing list of abandoned minor railways. It was closed to all traffic from March 31 last and the Order for the winding up of the company was issued by the Ministry of Transport on May 20. Probably, by reason of its somewhat remote position among the Derbyshire Hills, this railway was but little known outside its own particular sphere of operation, and its passing has not attracted the attention of either the local or national press. This 7½-mile line of 2 ft. gauge was primarily an adjunct to the undertaking of the Clay Cross Co. Ltd. (its owner) but it also carried public traffic. The Clay Cross Company was founded in 1837, by George Stephenson, and thus there was an indirect link with the earliest days of railway construction. The Ashover Light Railway Company was incorporated by a Light Railway Order on December 4, 1919. It was built and stocked with surplus material from the 1914-18 war. It extended from Clay Cross Works to Ashover, and public traffic began on April 7, 1925. A descriptive article was published in *The Railway Gazette* of August 21, 1925. Passenger traffic on the line at first was heavy, but a decline soon set in, and it was suspended at the end of the summer of 1930. Thereafter, summer passenger services were worked thrice weekly until September, 1936, since when only occasional passenger trips have been performed.

New Seine Bridge at Argenteuil

THE Argenteuil bridge over the Seine on the Paris-Mantes line of the French National Railways Western Region was one of the many destroyed during the war. It consisted of three spans each of 142 ft., flanked by two of 106½ ft. As an emergency measure a temporary timber-pile and steel-girder bridge was built in 1945, but it has recently been replaced by a permanent structure. In order to utilise the original pier foundations, steel sheet-piling coffer dams were constructed round the damaged piers, and their twin cast-iron cylinders were dismantled to within 3 ft. of the river bed. On the remaining cylinder stumps, reinforced concrete caps were cast to carry the new piers, consisting of twin columns of the same materials, which were also used to form a thin wall encasing each pair of columns. The piers thus appear to be solid. The abutments were rebuilt to the original design. As the construction depth of the new spans was limited by the headway required for navigation, half-through twin-truss spans were adopted. The cross girders are carried by vertical members at the main-girder

lower chord panel points, so that the load is distributed between the top and bottom chords. Concrete decking is provided over the cross girders and stringers.

Automatic Train Announcing Apparatus

THE increasing adoption of loud speaker train announcing arrangements has given rise to much research into the best means of giving announcements calling for repetition at regular intervals without an announcer being obliged to speak them continuously, a task involving a considerable amount of effort with a very frequent service. The need for some such apparatus, which should combine ease of control with wide flexibility in operation, has been felt by the authorities of London Transport, and we publish in this issue a description of a new announcement recording mechanism, using the magnetic tape method, designed specially to meet the requirements obtaining on the Underground lines, where not only are frequent repetitions of the same announcement called for, but ability to provide additional ones and vary the arrangements on special occasions, sometimes at short notice, is essential. The new apparatus has been built on the modern principle of using "plug-in" elements enabling any item of equipment to be changed at once, should failure or altered conditions necessitate it.

Failure to Provide Proper Warning

THE derailment near Strathmiglo, Scotland, on November 27, 1949, when a locomotive of a ballast train proceeding to relaying operations plunged into a gap in the track, fatally injuring the driver, was inquired into by Colonel R. J. Walker, Inspecting Officer of Railways, Ministry of Transport, and his report is summarised elsewhere in this issue. There was no confliction of evidence on any material point, and the acting permanent way inspector admitted that he forgot to put out a flagman according to rule, although he knew the train was coming. The same man also failed to make any arrangements to secure the co-operation of the nearest signalman, or the train crew, or to arrange for anyone on the train to guide it to the site. Colonel Walker finds it "surprising that a man of his good record and 29 years of railway experience could fail in this way and omit to take precautions which one might have expected to be almost instinctive." It was difficult to understand why the train was approaching so fast but there was a possibility that the wording of a notice, coupled with a conversation the driver had with the guard, had produced a preconceived idea that the train was to go to the far end of the job. Only when it was heard did the inspector realise his oversight.

Factors in Locomotive Design

IN passing judgment on the design of a locomotive, attention must not only be given to its detail construction and dimensions, but also to the proportions in which the latter stand to each other. Further, the proportional ratios of the potential cylinder power and the steaming capacity of the boiler form in themselves an interesting study, and provide a useful practical guide when a new locomotive design is projected. In this issue we publish the first part of an article dealing with the dimensions and proportions of a number of British locomotives now in evidence. The ratios of proportion appertaining to each of the different locomotive types examined form an interesting study. The information sets out the practice of different designers following an established school of thought, probably especially true of Great Western designs, while collectively a record is made of modern construction before standardisation, following in the wake of nationalisation. An examination of the proportional characteristics of the various locomotive types appears to bring certain features into prominence. An example is seen in the factor of adhesion employed. In some cases this has a relatively low value, so that it would seem that the maximum tractive force could not in practice be realised.

International Goods Traffic Accounting

THE new accountancy procedure for international goods traffic, adopted by the International Union of Railways in 1949, came into force on March 1, 1950; and is the subject of a study in a recent issue of the *Bulletin of the International Union of Railways* by M. Schérer, Chef de la Division de la Comptabilité et des Recettes, Service Commercial, French National Railways.

International rail consignments are accompanied, in addition to the consignment note, by a purely accountancy document called "invoice," on which are entered on departure, during transit, and on arrival the charges raised by the various railway administrations concerned. The receiving administration prepares from the invoices, which accompanied consignments to its own stations, accounts showing the reciprocal debits and credits of the participating administrations. Whatever the method of charging used it settles the transit costs, which are then refunded to it, in the case of carriage paid traffic, by the forwarding administration. Owing to the limited size of the invoice, and to simplify accountancy, the number of railway administrations whose charges may be entered on one invoice must not exceed three; if more than four administrations are concerned, the consignment must be re-invoiced at a station belonging to one of the transit administrations.

The procedure laid down after the 1939-45 war and obtaining before March of this year is outlined by M. Schérer. The re-invoicing administration was, for accountancy purposes, the consignee and consignor of consignments re-invoiced in its stations. For consignments forwarded from country A to country E, in transit through countries B, C, and D, with re-invoicing at the departure frontier station of country C, the regulations, supposing the charges of the administrations concerned to be respectively *a, b, c, d,* and *e,* were laid down as follows: In the case of carriage forward throughout, C paid *b* to B and *a* to A, whilst E paid *a plus b plus c* to C and *d* to D; in the case of carriage paid throughout, C paid *b* to B and *d* plus *e* to E, whilst A paid *b plus c plus d plus e* to C, and E paid *d* to D.

Before the war, currencies were convertible without restriction; the only consideration, therefore, was the quantitative balance of debits and credits. Since the general introduction of exchange control, the creditor must, in general, receive the amount of his credit in his national currency, by drawing on the open account in this currency in the creditor country in the name of the national bank of the debtor country. With exchange control, it is not sufficient to consider only the quantitative balance of debits and credits; the currencies in which settlements are to be effected must also be taken into account, as a national bank could not always be obliged either to settle a given sum in a certain currency and be refunded in another, or settle a debt in one particular currency.

Under the old procedure, most of the payments were not effected directly from the actual debtor to the actual creditor, and the method of payment was altogether different in the cases of carriage-forward or carriage-paid traffic. The monetary charges borne by the different administrations participating in any one consignment depended on the country in which re-invoicing took place and also on the method of charging applied. The railway administrations concerned were obliged, therefore, for each traffic relation, to choose the re-invoicing country and determine the method of charging which would best balance the monetary charges. The method of charging thus determined was made obligatory, and consignors could not request another.

These difficulties led the I.U.R. to decide on the use, so as to reduce the number of necessary re-invoicings, of an invoice enabling the charges of four countries, instead of three, to be entered; and to introduce the new accountancy procedure. The latter, explains M. Schérer, abolishes the purely financial considerations in re-invoicing; the administration on whose lines re-invoicing takes place, collaborates in checking purely railway debits and credits but is concerned no longer with settlements.

Settlements for a consignment from country A to

country, E, in transit through countries B, C, and D are now effected as follows: In the case of carriage forward throughout, E pays *a* to A *plus* the cost of the goods, *b* to B, *c* to C, and *d* to D. In the case of carriage paid throughout, E pays *b* to B, *c* to C, and *d* to D; A pays *b plus c plus d* to E, but in this case, the seller in country A adds to the cost of the goods the amount of transport costs which the buyer in country E must pay; therefore: E pays *a plus b plus c plus d* to A with the cost of the goods and, finally, in the accounts of the national banks concerned, E pays *a to* A *plus* the cost of the goods, *b* to B, *c* to C, and *d* to D.

In all cases, the receiving administration settles the charges of the transit administrations. The latter undertake, over their own lines and on account of another party, to transport goods; this transport constitutes an export which it is logical to debit to the country importing the consignment. Whatever the method of charging used, the international settlements are identical. It has been possible, therefore, to free the method of charging in the case of most traffic relations without awaiting the lifting of exchange control.

The new accounting procedure simplifies the work of re-invoicing stations, which now only have to prepare one abstract, "the abstract of re-invoiced consignments" instead of two accounts, "account of arrivals" and "account of forwardings." Its introduction does not debar use of the old, which is maintained in the I.U.R. forwarding regulations ("Prescriptions Internationales Marchandises"). Recourse to re-registration, however, must be exceptional, and can only take place in the case, for example, where settlements are impossible between a transit country and a receiving country, owing to the absence of Governmental agreements between these two countries, or for any other reason, on condition that all the railway administrations concerned agree.

Railcar Working in Sweden

AN account by the Swedish State Railways of their railcar services, of which a digest is given in a recent issue of the *Bulletin of the International Union of Railways*, states that the first railcars were delivered in 1934. Their use thereafter was extended regularly; the total of petrol and diesel railcars in 1948 was 315, with 176 trailers, and at present some 40 per cent. of the railcars are petrol and 60 per cent. diesel driven. In addition, experiments are being conducted with the conversion of diesel into electric units, a description of which was given in *The Railway Gazette* of July 14, 1950.

Railcars are particularly adapted to non-electrified secondary lines, where they are more economical than steam traction. Many of these secondary lines were constructed in the north and north-west of Sweden to serve very sparse populations and open up undeveloped regions. Where traffic is heavier, trailers are attached, with total seating accommodation for about 270. Railcars are also used to provide certain fast interurban services, and some of these vehicles incorporating buffets are more particularly reserved for excursion traffic.

The original railcars of 1934 were two-axle vehicles. Bogie railcars appeared in 1937; they were fitted with vacuum brakes. The first railcar equipped with diesel motors and air brakes was introduced in 1940. All these vehicles had wooden bodies. The first cars with welded-steel bodies were delivered in the summer of 1949, and were built for certain narrow-gauge lines. A number of these vehicles has also been ordered for the standard-gauge system. The new railcars and trailers are marshalled in various combinations, for which purpose they are fitted with automatic couplings. Each motor coach is equipped with an 8-cylinder diesel motor of 180 h.p. The driver can from the leading vehicle operate all motors and control all doors; all new vehicles intercommunicate.

The economies realised by diesel railcar over steam passenger train working are considerable. Compared with a train composed of one locomotive, one van, and two two-axle coaches, a railcar permits an economy of Kr. 1·20 per km., at the present cost of fuel (coal Kr. 90 per ton, fuel oil Kr. 0·15 per litre). In this comparison, no account has been taken of the possible alteration of steam engine depots rendered necessary by the use of railcars. The cost of a railcar has been estimated at Kr. 80,000. Depreciation amounts to 10·3 per cent. per annum; railcars with wooden bodies must, in effect, be amortised within twelve years. Depreciation of steam rolling stock is relatively insignificant. Furthermore, the crew of a light steam train comprises driver, fireman and guard, who also acts as ticket-collector. In the railcar there is only one man, who acts as driver, guard, and ticket-collector.

Locomotive Fuels in the Far East

THE report of the meeting of the inland transport experts as approved by the Fifth Session of the Economic Commission on Asia and the Far East, held under the ægis of the United Nations Economic & Social Council at Bangkok, Siam, earlier this year, recommended an expert examination of railways in Asiatic countries of the best methods of using available types of fuel. The Executive Secretary thereupon undertook an examination of the subject in collaboration with the railway administrations and prepared a report for submission to the *ad hoc* committee of experts on inland transport. Considerable technical data relating to the subject was supplied by the Central Standards Office of the Indian Railway Board and the Locomotive Manufacturers' Association of Great Britain.

Considering the importance and magnitude of the subject, the report can be considered only as a preliminary survey of the various problems involved, but it will serve as a basis for discussion by the experts concerned. The report deals with the types of fuel available in the countries under review, as it is considered that the type used on locomotives is governed by economic factors, such as cost of fuel and its transport availability, and considerations of the rational use of national resources. The report points out that considerable quantities of firewood for locomotive fuel are used in Burma, Indo-China, and Siam, and to a lesser extent in Ceylon, India, and Indonesia. The locomotives are equipped with special grates, fire doors, and spark arresters; firewood is bulky and refuelling has to be carried out at rather short intervals of approximately every 100 km.

It is, however, considered that when national resources of other fuels are limited or these resources are so far from the point of use that transport costs are exhorbitant, firewood can be the most economical type of fuel for locomotives. Unlike other fuel resources firewood can be made available artificially in plantations of quick-growing species such as casuarina and eucalyptus.

The Secretariat has made a short survey of the use of firewood on the Royal State Railways of Siam. This shows that Siamese firewood is more economical than coal or bunker oil; diesel locomotives have a slight advantage over steam locomotives fuelled with wood, largely because of their operating advantages. In reply to a request by the Secretariat the Finnish State Railways has submitted a report on the use of firewood which indicates that the percentage of firewood and coal used depends on the fuel market and may vary from year to year. The timber industry being the most important industry in Finland, it is possible when felling wood to keep a quantity of suitable cuttings for domestic use, and it is in the interest of the national economy of the country to use this surplus even at a time when the price of coal is 71 per cent. of that of wood for the same heating value.

A report submitted to the United Nations Economic & Social Council on March 25, 1950, by the Committee on Industry & Trade, which carried out a study of coal and iron-ore deposits in the region, contains a table giving the distribution of the deposits of coal and sub-bituminous coals and lignites. The calorific value is high; in Indonesia it closely resembles the calorific value of higher-grade coals, and it is considered that, despite certain disadvantages, lignite can be used in locomotives when the boilers

have a sufficiently large grate area and other features adapted to the use of such fuel. From information contained in the report the quantities of lignite used in European countries for locomotive fuel in 1938 were as follows:—

Country	Total tons fuel	Total tons lignite	Lignite, per cent.	Calorific value lignite, cal./kg.
Bulgaria	631,000	631,000	100	4,200-5,000
Czechoslovakia ...	2,035,000	1,088,000	38	4,200
Hungary ...	1,116,000	766,000	69	3,100-5,400
Roumania ...	1,704,000	501,000	29	4,500
Jugoslavia ...	1,747,000	1,441,000	82	2,500-5,500

Little information is available on the methods used other than that lignite was sometimes mixed with high-grade coal to improve the calorific value.

A report on the use of pulverised lignite has been received from the Victorian Railways. A test locomotive has been fitted with equipment for burning pulverised lignite (46 per cent. volatile matter, 46 per cent. fixed carbon, 2 per cent. ash). The result will be compared with that of a locomotive firing black coal from New South Wales (28 per cent. volatile matter, 50 per cent. fixed carbon, and 19 per cent. ash).

Tests were also carried out on the Victorian Railways with a stoker-fired locomotive using lignite briquettes (42 per cent. volatile matter, 42 per cent. fixed carbon, and 2 per cent. ash). This test was unsuccessful because of the sparks emitted from the exhaust. No information is available on the use of lignite in this region, but it is considered that this form of using lignite may, nevertheless, give good results in other countries and might be given a serious test. When air dried lignite is brought under heavy pressure it acquires a certain hardness without the use of a binding element. The briquettes thus made deteriorate much less easily in the air than raw lignite, and it would probably be much easier to maintain a good fire with briquettes than with raw lignite because the briquettes pile up irregularly in the firebox and leave plenty of space for air.

Tests with pulverised high-grade coals made in Germany, France, and the Netherlands before the war were abandoned for various reasons. In a recent test on American railways, with a gas turbine using pulverised coal, certain difficulties were overcome by storing the coal in very small-size grains, and pulverising it in the locomotive by smashing these grains in a violent air current against a fixed object and at the same time exploding the grains by a sudden change in air pressure of the current.

The Royal State Railways of Siam owns 206 steam locomotives and all are equipped for burning firewood. From a report submitted by the Directorate of Railways and the Forestry Department of Siam, the consumption of firewood by the railway has been:—

Year	cu. m.
1938	409,000
1939	504,000
1947	671,000
1948	661,000
1949	737,000
1950 (estimated)	800,000

The increase is mainly due to increased traffic, but there has been a decline in the quality of available firewood. Normally, the railway obtains its supplies by arrangement with the Forestry Department—except when the supply becomes critical, when the railway makes local arrangements. Forest blocks up to 20 km. from the railway are specially allocated for fuel supply for railways, the supplies for sleepers and other categories of timber being arranged by the Forestry Department, and the extracting of tree branches and tops being carried out by a railway contractor.

The contractor hauls the firewood to the railway line, where it is stacked and later transported by rail to refuelling stations, usually situated at intervals of approximately 100 km. In the north and north-east, however, a light railway is used for carrying firewood to the railway. The report points out that no special effort is made for the regeneration of the felled areas, which in consequence are generally covered by a quick-growing, inferior species which may partly account for the gradual deterioration of the quality of supply. The railway prefers heavy wood, Pentacme spp and Shorea obtusa, but these are considered too valuable for the purpose, and the authorities are obliged to use other lighter varieties of inferior species. The cost of firewood varies considerably depending on the area; in the north-east the cost is 16-28 baht per cu. meter, in the southern area 45-45 baht per cu. meter, and in the Bangkok area is 60 baht. These prices include 4 baht per cu. meter royalty and forest improvement fees to the Department of Forests.

This difference in cost is accounted for by the varying wage levels, these being especially high in the south due to the labour demand in tin mines and of rubber plantations; the price of firewood shows an upward trend as the source of supply recedes from the railway. The report shows that in 1949 some locomotives used 6-7 cu. metres of firewood per 100 train km. at a cost varying between 185-220 baht. The cost of diesel traction was 77-87 baht per 100 km. based on a consumption of 150-170 litres, the cost of diesel oil being 510 baht/1,000 litres. The railway has placed orders for 50 diesel locomotives, 45 in the U.S.A. and 5 in Switzerland. The maintenance costs of diesel locomotives are higher than steam locomotives, but it is expected that with the improvements incorporated in the new diesels, forced ventilation in the traction motors, a considerable reduction in these costs is hoped for.

Among conclusions reached by the commission were that, taking into account the large deposits of lignite and other bituminous low-grade coal, every effort should be made by railways to use to the maximum this low-grade coal, and the opinion is expressed that this can be done with satisfaction by locomotives with suitably-designed boilers, and to a lesser degree by locomotives, without specially designed boilers, provided certain changes in boiler construction are made. It is also considered that probably the best long-term method of using low-grade coal would be in thermal power stations, enabling lines with dense traffic to be electrified.

Where supplies of both high-grade and low-grade coal are limited, use of oil-burning or diesel locomotives should be considered, preference being given to diesel locomotives. Countries having large resources of forests may economically use firewood, depending on type and availability; as firewood is the only renewable resource of fuel, special attention should be given to the conservation of natural forests in the most accessible regions for firewood supply to the railways and the creation of plantations of quick-growing species in convenient locations away from other fuel resources.

It is also considered that benefits would accrue from a discussion of the problem by the experts of railway administrations of the region and would provide for exchange of ideas covering technical methods already used, tests undertaken and results obtained, and would also enable the experts to consider jointly methods used and progress achieved in other regions. It is, however, suggested that the ad hoc committee recommend that the Asian and Far Eastern Railway Association, if set up, give priority to the study of the best use of low-grade fuel in locomotives.

If this Association is not established, or for as long as it is not functioning, the Secretariat might be requested to carry out a detailed study with the help of the various Governments, with special attention to features of existing locomotive boilers and of firing techniques used in the region, comparison of fuel consumption per gross ton kg., nature and methods of burning low-grade coal in other regions, methods of washing coal; especially low-grade coal, and the economic use of firewood as locomotive fuel.

CATERING WAGES REPORT.—The Catering Wages Commission has issued a report on its inquiry into the operations of the Catering Wages Act. This report emphasises the need for a continuance of the Wage Board machinery and suggests that the Board for the unlicensed section of the industry should be abolished and a single Board set up for licensed and unlicensed residential establishments in all parts of the country. Separate proposals are recommended for large and small establishments wherever situated. Satisfactory structure of wages and conditions, states the report, can best be built up gradually on the basis of voluntary collective agreements.

LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

Steam Distribution in Colonial Locomotives

July 27

SIR,—In the example given of a fast-moving piston valve in my article published in the June 30 issue of *The Railway Gazette*, an undetected typing error gave velocity and acceleration in feet per min. As the other figures indicate, this should be feet per sec.

Yours faithfully,
G. V. O. BULKELEY

Uvongo Beach, Natal

Blackfriars Bridge

August 4

SIR,—The publication in this week's issue of Mr. Brough's photograph of a bridge end at Blackfriars and your notes thereon were extremely interesting. These massive examples of Victorian architecture at its best (or worst, according to the taste of the viewer) are all too unknown, and of the hundreds that walk over the bridge daily, as I do, few are aware of their existence.

I have often wondered if it would be possible to have them painted in full colours, especially as they are so close to the Festival of Britain site. Perhaps this, in a small way, would keep the memory of the late unlamented London Chatham & Dover Railway green.

Yours faithfully,
C. J. FREEZER

100, Canonsleigh Road, Dagenham

The Mid-Suffolk Light Railway

August 4

SIR,—Looking recently at an old edition (about 1905) of the "Harmsworth Encyclopædia," I was surprised to see on the map of Suffolk a railway line connecting Westerfield, north of Ipswich, with Kenton, on the Haughley-Laxfield line. Intrigued, I looked at the railway map currently supplied with the A.B.C. timetable and found Kenton there described as Kenton Junction with a branch running south to Debenham; further, I discovered that the inch to the mile Ordnance survey map of the district shows that there is in fact an abandoned line between Kenton and Debenham.

In view of all this I should be pleased if you would tell me the circumstances which caused the Kenton-Westerfield line to be left incomplete and whether the section to Debenham was ever open to traffic. The "Harmsworth Encyclopædia" map also shows the Laxfield line as continuing to Halesworth. I was aware that Halesworth was its original destination and rather suspect the decision to terminate it at Laxfield was made concurrently with that to drop the Kenton-Westerfield project.

Yours truly,
D. V. HARRIS

70, Broad Walk, London, S.E.3

[The various lines referred to in this letter were all part of an undertaking called the Mid-Suffolk Light Railway. The company was incorporated on April 5, 1900, and secured powers under Light Railway Orders on that date and in 1901, 1903, and 1905. In all, some 41½ miles of standard-gauge line were authorised. The main line was intended to extend from Haughley Station on the Great Eastern Railway, through Kenton and Laxfield, to Halesworth. A branch was authorised from Kenton to Westerfield. The first sod was cut on this branch at Westerfield by the Duke of Cambridge on May 3, 1902. The works from Kenton to Debenham reached an advanced stage, and are therefore shown quite correctly on the ordnance survey map as a physical feature.

The first section of the line to be finished, the 19 miles of single track from Haughley to Laxfield, was opened for goods traffic on September 20, 1904. It was extended to Laxfield Mill and Cratfield in 1906, but use of the portion beyond Laxfield Mill was discontinued in February, 1912. The debenture interest fell into arrear in April, 1907, and in the following month a receiver and manager was appointed. No more construction was undertaken, and the works between Kenton and Debenham were left derelict. A passenger service between Haughley and Laxfield was inaugurated on October 29, 1908. During the 1914 war the rails were taken up on the Kenton to Debenham and the Laxfield Mill to Cratfield sections. The undertaking passed to the L.N.E.R. on grouping, at which time it had its own rolling stock of three locomotives, seven passenger vehicles, three vans, and 21 goods vehicles.—ED., *R.G.*]

The Littlehampton Collision

August 14

SIR,—I have read with much interest your report of the Ministry of Transport inquiry into the accident which occurred at Littlehampton on November 30, 1949, published in your August 11 issue, and would like to make some comments on the penultimate paragraph. This states that "Consideration has been given to changing the locking of No. 27 crossover so that the points at the platform end will lie normally for the up instead of for the down line. This alteration, though not providing a complete safeguard against collision, would have prevented the accident." Whilst it is true that this alteration would have prevented this particular accident, a collision could still occur in exactly the same way in the event of an incoming train being signalled into No. 1 platform instead of No. 3. The risk of a collision occurring is thus only transferred from one set of conditions to another. Both sets of conditions are, presumably, equally likely to arise, so the risk of collision would remain.

I would therefore suggest that a better method of solving the problem would be to arrange the points at the platform end of No. 27 crossover to lie normally "wide to gauge" (*i.e.*, with both blades open), so as to act as trap points to No. 2 platform road. This could easily be done by arranging the left-hand blade to work in conjunction with No. 24 crossover. This blade would not need to be bolt-locked, as it would normally be used only for movements in the trailing direction. The right-hand blade would, of course, be locked in the ordinary way when in the reverse position.

Yours faithfully,
DERRICK J. W. BROUGH

135, Mulgrave Road, Cheam

Coach Design

August 14

SIR,—I am grateful to Mr. G. Richard Parkes, writing in your issue of August 11, who obviously possesses an excellent knowledge of railway conditions in Canada and the U.S.A., for supporting my suggestions to replace the present old-fashioned carriages by complete trains of central aisle saloon coaches, and high-capacity wagons. I am grateful also to Mr. W. Evetts (February 24), with his wide colonial experience all round Africa, India and Ceylon.

Mr. Parkes wants the Railway Executive to build some of these up-to-date trains, and run them all over the country for public inspection. Tut! tut! Surely he does not think that the Railway Executive will do anything which might raise doubts in the public mind of its oft-repeated refrains that "Our railways are the best in the world," and that it is "satisfied that they are efficiently and economically conducted"?

Yours faithfully,
E. R. B. ROBERTS

Eynesbury, St. Neots

THE SCRAP HEAP

Fellow Traveller

Solicitor, at Dartford: He is a private gentleman—nothing to do with British Railways now.—*From "The Evening News."*

Liner Tender as Clubhouse

West Country yachting visitors to the Thames estuary may find some difficulty in recognising an old friend in the floating clubhouse of a popular yacht club. After Laird of Birkenhead built her for the Great Western Railway in 1891 for service at Plymouth, the iron tender *Sir Richard Grenville* was soon well known to thousands, largely because she was so often photographed alongside the ships she was serving. A twin-screw vessel of 420 tons gross, she was designed to have her upper deck as convenient as possible to the side doors of liners. She had been at work in peace and war for just 40 years when a new *Sir Richard Grenville* was ordered and the old vessel was renamed *Penlee* and later sold to the Dover Harbour Board and renamed *Lady Saville*, going back to Devonport as tender for the 1939-45 war. On the foreshore at Leigh-on-Sea her design proved just as useful for her present purpose as it did for her old.—*From "Shipbuilding & Shipping Record."*

Sand Modelling Competition

On behalf of the Great Northern Railway (Ireland) the Bangor Borough Council, County Down, on July 22, organised a sand modelling competition on the beach. Some 50 children took part, and after three hours of hard work their efforts were judged and prizes awarded. The winning design, with the slogan "Distant places are not so far, when you travel by the G.N.R.," is illustrated below.

Hanging Garden of St. Andrews

I visited St. Andrews recently and never in all my rail travel have I seen anything to equal the show of hanging plants in the station. It is superb.

I cherish pleasant memories of the courtesy of the station staff in bygone holidays—courtesy undiminished however heavy and harassing the tripper traffic.

Now I have been given something else to be grateful for, a floral display that will remain an enduring recollection.—*From a letter to the "Dundee Courier & Advertiser."*

First Love

I was first aware of her presence when I heard that vibrant contralto, and the next moment she was standing so close to me that I could have touched her. She was even more beautiful than I had expected, familiar as I was with all the pictures of her.

With her was the man whose name had ever been coupled with hers. To him she owed much of her fame. He loved her, understood her, and by driving, coaxing, and guiding he had helped her to beat all her many rivals.

As she stood there, a goddess in blue, white plume waving gaily in the air, I stared unashamedly, noting even the only piece of jewellery she ever wore, a modest ornament of gold given her by this man.

All this happened on a wayside Scottish station long ago. I knew we must all be bound for the same city terminus and manœuvred our party into the nearest compartment.

It was many years before I saw her again—and for the last time. With cruel necessities of a changing age, she was unkempt in dingy red, and her entourage—once so shining and gilded—was mixed and scruffy. But her beauty was still apparent, poignant in its dishevelment and lowly surroundings.

She was laid to rest some years ago, but men still remember, and write of her glory. I read and re-read what they write, and even now I have her picture before me, as she was on that summer's day 30 years ago. The cold mundane description (now an epitaph) reads:

Caledonian Railway Number 903, *Cardean*. Built at the St. Rollox Works, 1906, to the designs of J. F. MacIntosh. 4-6-0. Cyls. (2) inside 20 × 26 inches. Driving wheels 6 ft. 6 in. Weight without tender, 85 tons.

I wonder what has become of driver Gibson, the man who soldered the half sovereigns on to her regulator?—*From "Everybody's."*

William Wheelwright Portrait

On June 23, the American Ambassador, the Hon. Stanton Griffis, handed over to the Provincial Historical Museum of Rosario a portrait of William Wheelwright given by the Wheelwright Scientific School of Newburyport, Mass., U.S.A., the town in which he was born in 1798.

The Central Argentine Railway owed its existence to William Wheelwright, who acquired the concession for its construction and built the first line from Rosario to Córdoba as part of a trunk railway uniting the Atlantic and Pacific Oceans, a scheme destined never to come to complete fruition in the form he envisaged. He also built the Ensenada Port and the railway connecting it with Buenos Aires, today part of the General Roca Railway.

Royal Journeys

Royal journeys to Balmoral are now undertaken with less elaborate precautions than were insisted on by Queen Victoria, who, always apprehensive of railway travel, made it a rule that speed should not exceed 25 miles an hour, and that a "safety man" should be stationed at every half mile along the whole track from London to Ballater.

Her nervousness caused some amusing, as well as many embarrassing, moments to Mr. G. P. Neele, former Superintendent of the old London & North Western, who made many journeys to and from Balmoral in charge of the Royal train. He has recorded that, in spite of all the precautions taken, complaints from the Queen were frequent, and when the messenger was her Highland attendant John Brown these were apt to gain pungency in transmission.

One night Brown came to him and reported, "The Queen says the carriage is shaking like the De'il." On another occasion, when the train had to draw up at Forfar, owing to a hot axle, and the station was filled with the smell of hot oil, Brown came to him exclaiming furiously: "The Queen wants to ken what gars this d—— stink!"—*From "The Scotsman."*

Prize-winning design in G.N.R.(I.) sand-modelling competition organised at Bangor (see paragraph above)

OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

RHODESIA

Tonnages

Tonnage hauled during the twelve months totalled 5,377,661 (increase 652,595), comprising general goods 2,276,807, minerals 1,197,141, coal and coke 1,903,713. Chrome at 296,405 tons increased by 48,006, and copper at 341,301 increased by 45,478.

School Holidays Staggered

The Government of Southern Rhodesia has arranged to stagger school holidays slightly so that the large number of children travelling six times a year to and from the numerous boarding schools can more easily be conveyed by rail. Under the old arrangement when all the children were moved at one time, the railways had severely to restrict accommodation for ordinary passengers during the ten days in which the school trains were running.

BELGIAN CONGO

Electrification

M. Wigny, Belgian Minister of Colonies, has stated that it is proposed to electrify the 225-mile 3-ft. 6-in. gauge Matadi-Leopoldville Railway near the mouth of the Congo. It would form part of a 10-year hydro-electric development scheme for all that part of the Congo, and energy would be supplied from a hydro-electric station to be erected at the Tshopo Falls, on the Congo river.

ITALY

State Railways Accounts

The State Railways incurred a loss of approximately lire 61,000 million for the financial year ended June 30, 1950, more than double the budgeted working loss envisaged (lire 27,300 million). Receipts fell short by some lire 30,000 million of the estimated total of lire 169,000 million, and expenditure, estimated at lire 196,000 million, increased to lire 200,400 million, mainly due to the concession of higher salaries and wages made last April.

After the parliamentary debate during which the railway finances were discussed and the accounts approved, Signor D'Aragona, the Minister of Transport, emphasised that the working receipts, both on the State Railways and on the privately-owned railways, continued to decline. Subsidies which had to be granted to the private lines were mounting.

The Minister of Transport hinted at the necessity for each privately-owned railway to draw up a four-year plan. The war damage of the State Railways, based on the present value of the lira, amounted, stated the Minister, to lire 800,000 million. Reconstruction so far had absorbed lire 433,000 million. To complete the work of reconstruction a further lire 115,000 million was needed. As to the balance, he said that since the 1944-1945 working year no monetary revaluation of the means set aside for reconstruction had been carried out.

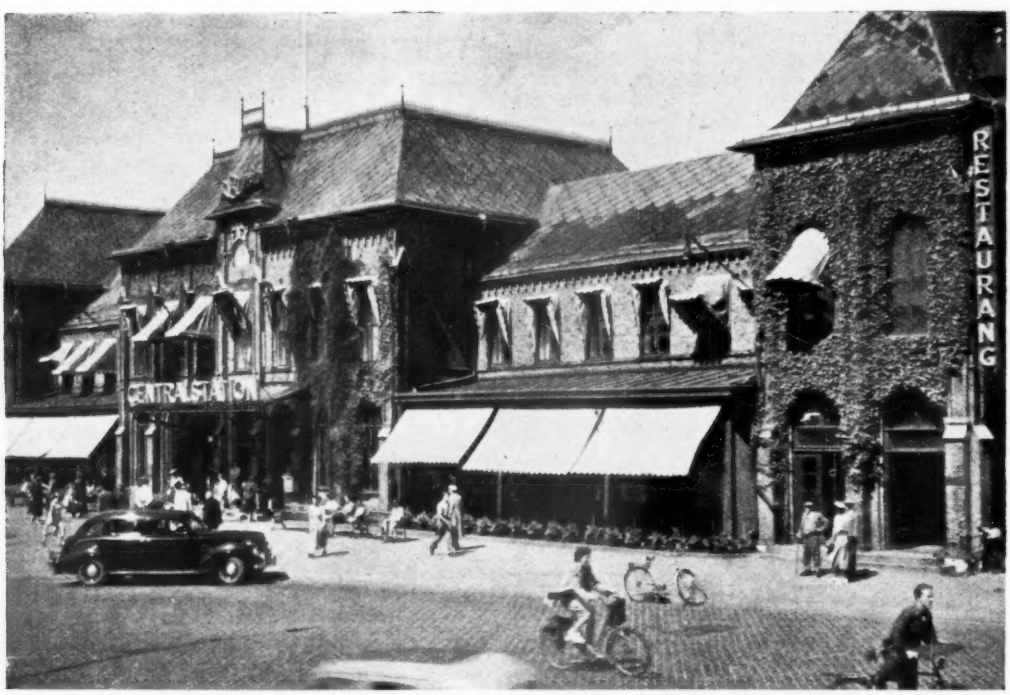
Proposed New Trunk Lines

The Ministry of Public Works recently approved two construction projects, though work on them may not begin for some time.

One scheme is for a new route from Spezia to Bologna, *via* Aulla and Fivizzano. New construction would be necessary from Fivizzano north-eastwards into the Rosaro Valley, with a tunnel five miles long under the Cerreto Pass emerging to the north-east of the Apennines near Collagna situated in the Secchia valley.

Descending this valley *via* Prignano and Fiorano, the new line would pass Sassuolo, and thence *via* Vignola to join the Pistoia-Porretta-Bologna line at Casalecchio sul Reno, six miles from Bologna. The distance from Fivizzano to Casalecchio sul Reno would be about 80 miles. The distance between Spezia and Bologna would thus be reduced to 107 miles, compared with 130 miles *via*

Swedish Station Design



Exterior of the Central Station at Gothenburg. The pleasing architectural style is reminiscent of a country town rather than a large commercial city

Photo] *[K. S. Dobson*

the existing Spezia-Parma and Parma-Bologna lines. The scheme is supported by local interests in Spezia, so as to attract transit traffic to that port, which is in competition with both Genoa and Leghorn, and partly because the importance of Spezia as Italy's main naval base has declined since the war.

FRANCE

Credit Voted for S.N.C.F.

A further credit of frs. 25,000 million (more than £25,000,000) has been voted by Parliament for the National Railways. M. Antoine Pinay, Minister for Public Works & Transport, said that this amount was necessary to enable the S.N.C.F. to meet payments due in October. It was agreed that the debate on the proposed reorganisation of the S.N.C.F. should be adjourned until Parliament reassembles in October. The proposals were recently the subject of prolonged discussions between M. Pinay and the chief railway officials, including M. Pierre Tissier, President of the S.N.C.F., and M. Louis Armand, Director-General.

The new credit is in addition to the subsidy of frs. 50,000 million previously voted. M. René Pleven, the Premier, had originally announced that the government would ask for supplementary credits of frs. 40,000 million in the form of Treasury advances. He indicated also that the government might have recourse to long-term loans to cover the budgetary expenditure.

Holiday Traffic

The S.N.C.F. has issued figures showing the holiday tickets issued at Paris stations for the four days July 28-31, as follows: Montparnasse 127,000; Paris-Lyon 120,000; Austerlitz 117,000; Nord 93,000; Saint-Lazare 63,000; Est 62,000, or 582,000 in all.

For the corresponding period last year the total number of tickets was 665,000. This year there was a decrease of at least 20,000 passengers travelling northwards, due probably to the events in Belgium.

Supplementary trains were announced as scheduled to be run from August 1 to 6 to cope with the "paid holiday" traffic at reduced fares. These trains included: Paris-Lyon 90, of which 20 were for August 4 alone; Montparnasse 50; Saint-Lazare 30; Est 30; Austerlitz 25; Nord 25. Special arrangements were made to handle advance bookings of the long queues of passengers. The traffic was greatest at Paris-Lyon, where the rush hours for the long-distance traffic are between 7 p.m. and 11 p.m. According to a Paris newspaper, a railway official said that on July 17 the number of trains dispatched was 34, instead of the 20 expected. *Rapides* of 600 *tonnes*, with 1,000 passengers were leaving for the south every five minutes.

DENMARK

Copenhagen Traffic Plan

A committee appointed six years ago to produce plans for railway, road, and tramway development in Greater Copenhagen has published its third report which deals mainly with proposed extensions of public transport in the suburbs. The plans are based on a major "origin-and-destination survey" carried out in connection with a population census in November, 1945, and on a detailed forecast of the population trend in each of the local authority areas around Copenhagen. The aggregate population is assumed to reach 1,400,000 by 1965.

Most of the future traffic between the outer suburbs and the central area is to be carried by an extended system of electric suburban lines. However, apart from indicating two further branch lines in the north and west, the report does not yet contain final details of the proposed new in-town routes, which are to be the subject of a further report.

Publications Received

British Railways. By Leonora Fry. London: Methuen & Co. Ltd., 36, Essex Street, Strand, W.C.2. 8½ in × 5½ in. 48 pp. Illustrated. Stiff paper covers. Price 2s.—This is one of the "Get to Know" series, intended for children with no previous knowledge of the subject. The main features of railway construction, track, layout, signalling, and operation are described in simple language, with the aid of diagrams drawn by C. W. Huxtable. A surprising amount of detailed information has been included, and the book should prove welcome to youngsters who are passing beyond the number-spotting stage, and beginning to take an interest in the many other aspects of the railway. A brief summary of the origin and development of the British railway system is given, together with an outline chronological table of important opening dates from 1825 to 1848.

German Permanent Way between the Wars. A special issue of *Der Eisenbahnbau*, No. 5/6; May—June, 1950. Frankfurt-on-Main. Dr. Arthur Tetzlaff Verlag. 50 pp. Illustrated. Price DM. 4·40. Thirty years ago the German railway administration created *Oberbaudezernate*, or special Permanent Way Departments attached to the Regional Administrations. Our contemporary *Der Eisenbahnbau* has taken the opportunity to review the development of the permanent way on the German railways during the two wars. The result is a valuable collection of specialised articles on the subject of much interest to those concerned with similar problems in this country, opening with a general review of the development since the formation of the Reichsbahn in 1920. There is a well-balanced discussion of the pros and cons of all-welded track by a leading official of the Ministry of Transport, Dr. Ing. Gerhard Schramm. Another article by Reichsbahnrat Hans Rosemeier deals with the well-known track testing car used for the periodical testing of the entire system at the rate of nearly 200 miles of track a day. Finally, there is an article by Dr. Ing. H. Saller on pre-stressed reinforced concrete sleepers. The number is concluded by a comprehensive, though almost exclusively German, bibliography.

Aluminium Alloy Extruded Sections.—This brochure, published by the Aluminium Development Association, 33, Grosvenor Street, London, W.1, contains some useful information and data on the application of aluminium alloy extruded sections in the construction of road transport vehicles. Both designers and users will find here much to interest them. Subjects dealt with include design and the application of various sections, diagrammatically illustrated, and workshop methods relating to machinery, bending and forming, welding, and so on. Included is an appendix containing tolerances for extruded sections, stock weights of aluminium sheets, rivet head shapes, dimensions and weights, mechanical properties of alloys for vehicle body construction, and average loaded weights of materials carried in bulk. Also included are lists of supplies of extruded sections and previous information bulletins as well as reprints of articles and papers.

The Institution of Locomotive Engineers.—A register of members of the Institution of Locomotive Engineers has recently been published by the Institution. The register, which is completed up to December 31, 1949, contains a list of officers at the London headquarters of the Institution and local centres both at home and overseas. A list of members was last published in 1939. Copies of the recent publication can be obtained at 28, Victoria Street, S.W.1, at a cost of 7s. 6d.

Transport Documentation.—The Netherlands Transport Institute, Laancopes van Cattenburch, 46, The Hague. —This is a new monthly publication of summaries of articles on economic and similar subjects published in leading transport journals throughout the world. The abstracts render as accurately as possible, and without comment, the point of view of the author. Each summary is concluded with the designation (ORIG) if reproduced verbatim from the original article, and with (NVI) or other designation if written by the Netherlands Transport Institute or other organisation. The subscription for a series of 1,000 abstracts, to be published in about ten monthly instalments, is 32 guilders.

Proportions of British Locomotives—I

Principal dimensional characteristics of modern locomotives on the six Regions

By E. C. Poultney, O.B.E., M.I.Loco.E.

IT is probably safe to say that the design of steam locomotives is largely empirical, and that, in general, new designs are usually based on former practice. Such being the case, it may be useful to put on record the principal dimensional characteristics of modern locomotives on British Railways, showing at the same time how their chief dimensions are proportioned in relation to each other, and to comment on the results obtained by such an analysis.

The information so obtained will record the work of several individual designers during recent years, and, as certain new standard locomotive types will be constructed in the near future, the dimensions of these may be compared with former practice. As the design of the new standard locomotives for British Railways will, no doubt, be based on the combined experience of different engineers, it will be of interest to note in due time how their principal proportional ratios compare with previous locomotives of the same types.

Scope of Analysis

The present analysis is confined to locomotives of modern design, and comprises in all a total of 63 different engines. The types and numbers of those examined are as follow:—

Table 1: Pacific 4-6-2 types, 12.
Table 2: 4-4-0 passenger, 6; 4-6-0 passenger, 11; 4-6-0 mixed-traffic, 8.
Table 3: 0-6-0 freight, 6; 2-6-0 freight, 10; 2-8-0 freight, 5.
Table 4: 2-6-2 mixed-traffic, 2; 2-8-2 freight, 1; 2-8-2 passenger, 1; 4-6-4 passenger, 1.

To complete the comparison, two other examples, taken from Table 3, are included in Table 4. They are one each 2-6-0 and 2-8-0 types. Only one railway has made use of 2-6-2 and 2-8-2 tender types, this is the former L.N.E.R. The table sets out the practice followed on this line, referring particularly to the work of the late Sir Nigel Gresley. The 4-6-4 passenger engine is the only one having this wheel plan, and is the experimental high-pressure compound engine No. 10000, rebuilt as a modified 3-cylinder simple expansion Pacific. To date, this is the most powerful express passenger locomotive on British Railways.

All the examples considered are of the simple expansion type and use superheated steam. The superheaters are all of the type A, as opposed to the type E, which has so far only been fitted to two locomotives, of the former L.N.E.R. classes, A3. 4-6-2 and Pl. 2-8-2. The proportions of these engines thus equipped are not examined.

The dimensions examined and the symbols used to represent them are as follow:—

Wt = engine weight in working order
Wa = adhesive weight, *i.e.*, the weight on the coupled wheels
d = cylinder dia.
s = piston stroke
D = dia. of the driving wheels, *i.e.*, the coupled wheels
P = boiler working pressure
R.T.F. = rated tractive force, or maximum tractive force
S = heating surfaces, evaporative
Sh = superheater surface
St = combined heating surfaces
GA = grate area

The weights are given in lb.; the cylinder and wheel dimensions are in in.; heating surfaces and grate areas in sq. ft.; and the steam pressures are in lb. per sq. in.

Based on the foregoing, the computed proportional ratios are as follow:—

$$\text{A} = \text{factor of adhesion} = \frac{\text{Wa}}{\text{R.T.F.}}$$

$$\text{B} = \text{boiler factor} = \frac{\text{R.T.F.}}{\text{S}}$$

$$\text{BD} = \text{boiler demand factor} = \frac{\text{R.T.F.} \times \text{D}}{\text{S}}$$

$$\text{grate factor} = \frac{\text{R.T.F.}}{\text{GA}}$$

The factor of adhesion A is the ratio existing between the force tending to rotate the driving wheels and the weight pressing the wheels on the rails preventing their rotation. A high value indicates a considerable resistance to slipping, while, conversely, a low value indicates the possibility of slipping and will tend to prevent the utilisation of the full rated tractive force that can be developed by the cylinders.

The ratio required to prevent slipping depends on the arrangement of the cranks and other factors, such as rail conditions, but usually a factor of 4 is considered a minimum value for two-cylinder engines, a recommended value being 4·2 for ordinary conditions on account of varying crank efforts.

The factors B, BD, and R.T.F./GA show how the steam producing and steam using elements of the locomotive are related.

In order to indicate the boiler steaming capacity, the following ratios are given:—

$\frac{\text{F.B.S.}}{\text{S}}$ = firebox heating surface per cent. of total evaporative heating surface

$\frac{\text{Sh}}{\text{St}}$ = superheating surface per cent. of total or combined heating surfaces

$\frac{\text{St}}{\text{GA}}$ = combined heating surfaces per sq. ft. of grate area.

The idea underlying the choice of these factors will first receive attention. The evaporative capacity of the boiler depends on the disposition of the heating surfaces and the amount of heating surface allowed for each sq. ft. of grate area. In addition, the amount of superheating surface must be taken into account. The larger the superheating surface is in relation to the total or combined heating surfaces, the less will be the evaporative capacity, though the difference is more than made up by the reduction of the steam consumption per h.p. developed consequent upon the higher superheat carried by the steam delivered to the cylinders.

A large firebox with a correspondingly large grate in relation to the total heating surface increases the evaporative power of the boiler; for this reason, therefore, the ratio $\frac{\text{FBS}}{\text{S}}$ expressing the firebox heating surface as a percentage of the total evaporative surface is introduced. Similarly, the factor $\frac{\text{Sh}}{\text{St}}$ expressing the superheater surface as a percentage of total or combined heating surfaces is used to furnish some idea as to the amount of superheat attained.

The remaining factor $\frac{\text{St}}{\text{GA}}$ is included to show how much of the combined heating surfaces is allowed for each sq. ft. of grate area, the superheating surface being included for the reason that a proportion of the heat liberated by the grate is utilised to superheat the steam and is not available for evaporation and steam production. In other words, not all the heat available for absorption is transferred over the water heating surfaces. Before leaving consideration of this factor, it may be as well to point out that without some knowledge of the heat content of the fuel used this factor would not be of much value for the reason that, when fuels of a low calorific value are used, it is necessary to increase the area of the grate in relation to the heating surfaces for a given rate of evaporation.

Since this analysis deals only with locomotives on British lines, the factor is of use because the differences in the fuels employed vary only within comparatively narrow limits.

The formula for computing the maximum tractive force, R.T.F., of a simple expansion locomotive is well known. It is expressed as:

$$\text{R.T.F.} = \frac{d^2 . s . P . 0.85}{D}$$

As written, the expression gives the tractive force for a two-cylinder engine. For three cylinders, the result is multiplied by 1·5, and for a four cylinder engine by 2. This assumes that all cylinders are of equal dimensions. The formula gives the rated tractive force in

lb., exerted at the rim of the driving wheels at the point of contact with the rails. The factor 0·85 does not indicate the mean pressure acting on the pistons, but is intended to indicate the mean pressure referred to the rim of the driver, making allowance, therefore, for machine friction.

The boiler factor B, designated as $\frac{\text{R.T.F.}}{S}$ is the tractive force exerted for each sq. ft. of evaporative heating surface, and at a given speed in m.p.h. is proportional to the h.p., which must be furnished per sq. ft. of heating surface. This can be seen, if it is assumed that Ti is the indicated tractive force measured in the cylinders, and that V is the speed in m.p.h. The i.h.p. is then I.H.P. = $\frac{\text{Ti} \times \text{V}}{375}$ and the i.h.p. per sq. ft. of heating surface is $\frac{\text{Ti} \times \text{V}}{5 \times 375}$.

Since $\frac{\text{Ti}}{\text{S}}$ is proportional to $\frac{\text{R.T.F.}}{\text{S}}$ we can write B for $\frac{\text{Ti}}{\text{S}}$.

The boiler demand factor, BD, is simply the factor B multiplied by the diameter of the driving wheels in inches, and is proportional, therefore, to the ft. lb. of work done per rev. of the driving wheels, and at some given number of revs. per min. also proportional to the h.p. developed. The use of these factors for the comparison of locomotives may be delineated as follows:—

If the locomotives compared work under similar boiler conditions so that the amounts of steam produced by each sq. ft. of heating surface are the same in each case and each requires the same amount of steam per h.p.hr., then, at a given speed, the proportion of the R.T.F. which each engine can develop will be inversely proportional to the respective values of B, if the speeds in m.p.h., are the same, or BD for an equal number of revs. per min. Further, if each develops the same percentage of the R.T.F., then the speeds attained will be inversely proportional to the factors B and BD, again either on the basis of m.p.h., or revs. per min.

Comparison of Engine Conditions

The comparison may also be made on the assumption of similar engine conditions. If two locomotives work under similar engine conditions, using the same amount of steam per h.p.hr. and develop the same percentage of their rated tractive force, the amount of steam to be furnished per hr. by each sq. ft. of evaporating heating surface will be measured by the respective values of the factor B when the speeds in m.p.h. are the same, and by the factor BD when the speeds in revs per min. are equal. Usually, the factor BD is a better measure than B of the demand made on the boiler by the cylinders, because steam consumption and the proportion of the tractive force developed depends more directly on revs. per min. than on speed in m.p.h.

It may be pointed out that, if engines compared have driving wheels of the same dia., they can be compared equally well by either the B or BD factors. The difference comes when the locomotives of the same type have wheels of different dia., proportioned according to their working speeds; that is to say, when the revs. per min. are the same. Under such conditions, the value of the factors BD will be approximately equal, but the slower speed engine with smaller wheels will show a higher value for the factor B.

The factor $\frac{\text{R.T.F.}}{\text{GA}}$ expresses the pounds of tractive force allowed for each sq. ft. of grate area, and, therefore, at a given speed, m.p.h. is proportional to the the h.p. developed per sq. ft. of grate area per hr. The amount of tractive force allowed per sq. ft. of grate will depend on the quality of the fuel used, being less for fuels of low heat value, while for high-quality fuels a smaller grate may be used. In some instances, a comparatively large grate area is provided, when for any reason the size and weight of the boiler is limited so as to raise the rate of evaporation per sq. ft. of heating surface.

In general, a large grate in proportion to the rated tractive force is an advantage, because, for a given h.p. output, the rate of firing is lower and the evaporation per lb. of coal fired thereby increased. It may be said that at the higher running speeds, corresponding to about 250-300 r.p.m. approximately 40 to 45 h.p. can normally be developed in the cylinders for each sq. ft. of grate area when coal of average quality is used. This factor may be of further interest on account of the fact that in some instances specifications for locomotives stipulate the size of the grate in relation to the rated tractive force.

The Pacific 4-6-2 locomotives referred to in Table I are divided into two categories; those having driving wheels

TABLE I—DIMENSIONS AND PROPORTIONS OF PACIFIC 4-6-2 LOCOMOTIVES

Railway	Weight (lb.) Wt	Adhesive weight (lb.) Wa	Cylinders, No. (dia. and stroke) (in.) d × s	Driving wheels dia. (in.) D	Steam pressure, lb. per sq. in. P	Rated tractive force (lb.) R.T.F.	Evaporative heating surface (sq. ft.) S	Superheater surface (sq. ft.) Sh	Total heating surface (sq. ft.) St	Grate area (sq. ft.) GA	Firebox heating surface per cent. evaporative FBS/S	Superheater surface per cent. combined Sh/St	Adhesive weight ÷ tractive force A	R.T.F. ÷ evap. heating surface B	R.T.F. × dia. of drivers ÷ evap. heating surface BD	R.T.F. ÷ grate area R.T.F./GA	Comb. heating surface ÷ grate area St/GA	Class
Passenger Engines																		
L.N.E.R. ...	207,088	134,400	3 20 × 26	80	180	29,835	2,930	525	3,455	41·25	7·34	15·2	4·5	10·2	816	728	83·7	"A.1" 1922
" ...	215,600	148,176	3 19 × 26	80	220	32,909	2,692	703	3,398	41·25	7·99	20·7	4·5	12·2	976	792	82·2	"A.3" 1928
" ...	230,608	147,840	3 18½ × 26	80	250	35,455	2,576·3	748·9	3,325·2	41·25	8·97	22·4	4·16	13·7	1,096	859	80·5	"A.4" 1935
" ...	227,360	147,840	3 19 × 26	80	250	37,397	2,576·3	748·9	3,325·2	41·25	8·97	22·4	3·96	14·5	1,160	919	80·5	Rebuilt "A.1"
" ...	233,184	147,840	3 19 × 26	80	250	37,397	2,461·3	679·6	3,141·04	50·0	9·93	21·6	3·96	15·2	1,216	748	62·8	New "A.1" 1948
L.M.S.R. ...	235,760	149,844	4 16½ × 28	81	250	40,000	2,807	830	3,637	50·0	8·2	22·8	3·74	14·2	1,150	800	72·7	"Duchess"
" ...	234,080	151,200	4 16½ × 28	78	250	40,300	2,516	598	3,114	45·0	8·5	19·1	3·75	16·0	1,245	896	69·3	"Princess Royal"
Mixed-Traffic Engines																		
L.N.E.R. ...	227,360	147,840	3 19 × 26	74	250	40,430	2,461·3	679·6	3,141·04	50·0	9·93	21·6	3·65	16·4	1,213	810	62·8	"A.2"
" ...	227,360	147,800	3 20 × 26	74	225	40,318	2,453	679·6	3,132·7	50·0	9·67	21·6	3·66	16·4	1,213	807	62·6	Converted "P.2"
" ...	219,520	147,800	3 19 × 26	74	225	36,387	2,431	679·6	3,110·7	41·25	8·95	21·8	4·06	14·9	1,102	880	75·2	Modified "V.2"
S.R. ...	212,240	141,120	3 18 × 24	74	280	37,500	2,451	822	3,273	48·5	11·2	25·2	3·76	15·3	1,132	773	67·4	"Merchant Navy"
" ...	192,640	123,760	3 16½ × 24	74	280	31,000	2,122	545	2,667	38·25	11·9	20·4	3·99	14·5	1,073	812	69·8	"West Country"

TABLE 2—DIMENSIONS AND PROPORTIONS OF 4-4-0 AND 4-6-0 LOCOMOTIVES

Railway	Weight (lb.) Wt	Adhesive weight (lb.) Wa	Cylinders, No. (dia. and stroke) (in.) d s	Driving wheels dia. (in.) D	Steam pressure, lb. per sq. in. P	Rated tractive force (lb.) (sq. ft.) R.T.F.	Evaporative heating surface (sq. ft.) S	Super-heater surface (sq. ft.) Sh	Total heating surface (sq. ft.) St	Grate area (sq. ft.) GA	Firebox heating surface per cent. evaporative FBS/S	Super-heater surface per cent. combined Sh/St	Adhesive weight / tractive force A	R.T.F. ÷ evap. heating surface B	R.T.F. × dia. of drivers ÷ evap. heating surface BD	R.T.F. ÷ grate area R.T.F./GA	Comb. heating surface ÷ grate area St/GA	Class
4-4-0 Passenger																		
L.M.S.R. ...	120,960	78,288	2 19 × 26	81	180	17,729	1,157·5	252·7	1,410·2	21·1	10·7	17·85	4·40	15·3	1,239	840	66·8	Class 2P
,, ...	147,840	94,080	3 17 × 26	80	180	21,556	1,397·7	271·8	1,669·5	26·0	12·2	16·22	4·36	15·4	1,232	826	64·2	" Shire " D49
,, ...	136,976	89,152	2 20 × 26	81	180	19,644	1,543	209	1,752	26·6	10·02	11·90	5·02	12·7	1,028	754	65·8	Class D11 (G.C.R.)
S.R.	129,472	84,224	2 19½ × 26	80	180	18,910	1,407	235	1,642	22·5	10·9	14·30	4·44	13·4	1,072	840	72·9	Class L1
,, ...	150,304	94,080	3 16½ × 26	79	220	25,130	1,766	282	2,049	28·3	9·18	13·75	3·74	14·2	1,121	887	72·4	Class V
,, ...	116,920	75,488	2 19 × 26	80	180	17,950	1,276·9	228	1,504·9	24·0	9·96	15·10	4·20	14·0	1,120	748	62·7	Class D1
4-6-0 Passenger																		
L.M.S.R. ...	190,176	139,900	3 18 × 26	81	250	33,150	2,081	416	2,497	31·25	10·0	16·65	4·22	15·9	1,289	1,060	79·7	Class 6P (Royal Scot)
,, ...	185,920	136,800	3 18 × 26	81	250	33,150	1,862	348	2,210	31·25	10·43	15·75	4·12	17·7	1,433	1,060	70·7	Class 6P (converted)
,, ...	180,880	133,840	3 18 × 26	81	200	26,520	1,735	365	2,100	30·5	10·53	17·38	5·04	15·2	1,231	870	68·7	Class 5XP (Patriot)
,, ...	178,192	133,840	3 17 × 26	81	225	26,610	1,641	307	1,948	31·0	11·0	15·75	5·02	16·2	1,312	859	62·8	Class 5XP (Silver Jubilee)
,, ...	183,680	137,760	3 17 × 26	81	250	29,590	1,862	348	2,210	31·25	10·43	15·75	4·65	15·8	1,279	945	70·7	Class 5XP (large taper boiler)
G.W.R. ...	169,344	124,096	4 15 × 26	80½	225	27,800	1,841·3	262·6	2,104	27·07	8·40	12·45	4·46	15·1	1,215	1,030	77·7	" Star," 15 in. cyls.
,, ...	178,864	131,824	4 16 × 26	80½	225	31,625	2,018	262·6	2,280	29·36	8·13	11·5	4·16	15·7	1,263	1,080	77·7	" Castle " Class
,, ...	199,360	151,100	4 16¼ × 28	78	250	40,300	2,201	313	2,514	34·3	8·80	12·4	3·74	18·3	1,428	1,175	73·2	" King " Class
L.N.E.R. ...	173,040	121,510	3 17½ × 26	80	180	25,380	1,676	344	2,020	27·5	10·01	17·0	4·78	15·1	1,208	921	73·4	Class B17
S.R.	187,040	138,768	4 16½ × 26	79	220	33,500	1,989	376	2,365	33·0	9·76	15·85	4·13	16·8	1,330	1,013	71·7	" Lord Nelson " Class
,, ...	181,328	134,430	2 20½ × 28	79	200	25,320	1,878	337	2,215	30·0	8·62	15·22	5·30	13·5	1,167	845	73·8	" King Arthur " Class
4-6-0 Mixed-Traffic																		
L.M.S.R. ...	161,504	121,510	2 18½ × 28	72	225	25,455	1,650	348	1,998	28·65	10·35	17·4	4·77	15·4	1,108	889	69·7	Class 5
G.W.R. ...	172,144	132,384	2 18½ × 30	75	280	32,580	1,714	265	1,979	28·84	9·85	13·4	4·07	18·9	1,420	1,129	68·7	Class 1000 (County)
,, ...	168,000	126,560	2 18½ × 30	72	225	27,275	1,841·3	262·6	2,104	27·07	8·40	12·45	4·63	14·8	1,065	1,001	77·7	" Hall " Class
,, ...	165,760	123,640	2 18½ × 30	68	225	28,875	1,841·3	262·6	2,104	27·07	8·40	12·45	4·27	15·7	1,067	1,005	77·7	" Grange " Class
,, ...	154,336	112,896	2 18 × 30	68	225	27,340	1,425·5	160	1,585·5	22·1	9·84	10·10	4·13	19·1	1,300	1,241	71·6	" Manor Class
L.N.E.R. ...	159,376	117,600	2 20 × 26	74	225	26,876	1,676	344	2,020	27·9	10·01	17·0	4·37	16·0	1,185	963	72·5	B1 Class
S.R.	179,088	131,714	2 21 × 28	72	180	26,200	1,878	337	2,215	30·0	8·60	15·22	5·02	13·9	1,000	875	73·8	Class H15
,, ...	177,520	132,720	2 20½ × 28	67	200	29,860	1,878	337	2,215	28·0	8·62	15·22	4·44	15·9	1,066	1,065	79·0	Class S15

of from 78 to 81 in. dia. are for high speeds, while those having smaller wheels, 74 in. dia., are for lower speeds.

The relative values of the B and BD factors appear to show that this is the case. The first three examples are interesting as showing three successive steps taken by the late Sir Nigel Gresley in the development of Pacific locomotives for high-speed passenger services.

The first example is the original design of 1922, distinguished by having very considerable boiler capacity in relation to the steam demand by the engines. The reason for the excellent reputation these engines have always had for handling heavy and fast traffic is evident. The class A3 "Super Pacific," introduced in 1928, has the same boiler with a modified tube and flue arrangement designed to give more superheater surface. This change, together with some increase in the rated tractive force, increased the boiler factors; it is, therefore, evident that it was the intention to run at earlier cut-offs when operating train loads equal to those handled by the A1 series.

The third example is the streamline Class A4. These engines have the same boilers as for the A3 Class, but modified by having a larger firebox, due to the combustion chamber being lengthened and the tubes correspondingly reduced in length. The net result is a reduction of the evaporative heating surfaces, and, compared with the Class A3, a considerable increase in the h.p. demanded per sq. ft. of heating surface at equal working speeds and when the engines are developing equal proportions of their rated tractive force. On the other hand, as the maximum rated tractive force of the A4 is about 7 per cent. more than the A3, when working the same trains the relative boiler demands would not be much different. The proportions of the two L.M.S.R. Pacific designs show that, when the later "Duchess" class was designed, the values of factors B and BD were reduced, compared with the "Princess Royal" series, thus indicating a locomotive intended for high-speed traffic.

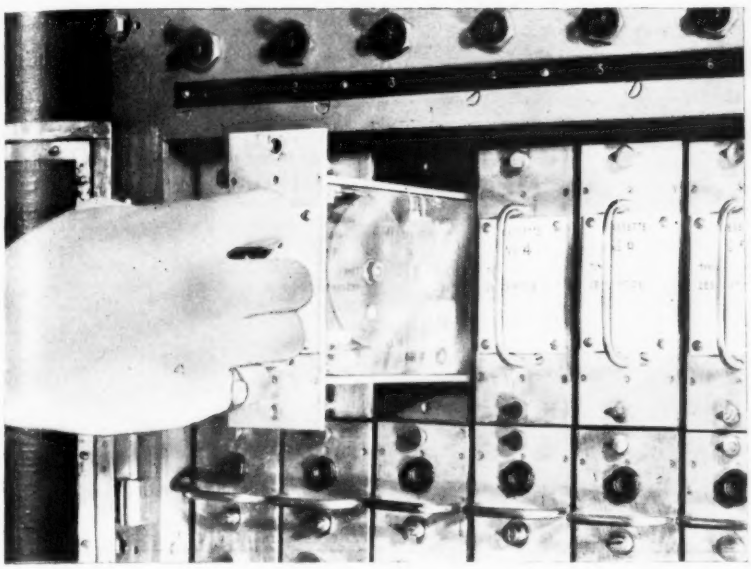
It is interesting to note that the principal proportions of the "Duchess" and the Class A4 locomotives are very similar. The Pacifics with the smaller wheels, 74 in. dia., show ratios of relatively higher values, which would seem to indicate engines intended for lower speed operation. In some cases the factor of adhesion is very low, making it doubtful if the full rated tractive force could be obtained.

The future position of the well-known 4-4-0 passenger locomotive is rather uncertain; probably it will give place to a six-coupled design of the 4-6-0 type. In view, however, of the comparatively large numbers of 4-4-0 engines in service, a few examples are included. Locomotives of the 4-6-0 type are extensively used for passenger train working. The examples in Table 2 are divided—one for fast passenger and another for intermediate passenger services and fast freight.

(To be continued)

Automatic Train Announcing Apparatus

Equipment for recording and repeating a number of train announcements by using magnetic tape apparatus with quick substitution facilities



Tape cassette being removed from Westinghouse automatic train announcer

TO meet the requirements of the London Transport Executive the Westinghouse Brake & Signal Co. Ltd. has developed an automatic train announcing apparatus to convey information to the public at stations. Its principles are such, however, that it can be readily adapted to a number of other purposes where such announcements need to be made. Loud speaker announcing is playing an increasing part in the directing of passengers at stations, boat landing stages, and so on, and equipment which will enable the same message to be repeated at intervals, as required, without an announcer having continually to speak it himself, or a new announcement to be arranged for easily, should prove very attractive in the transport world generally.

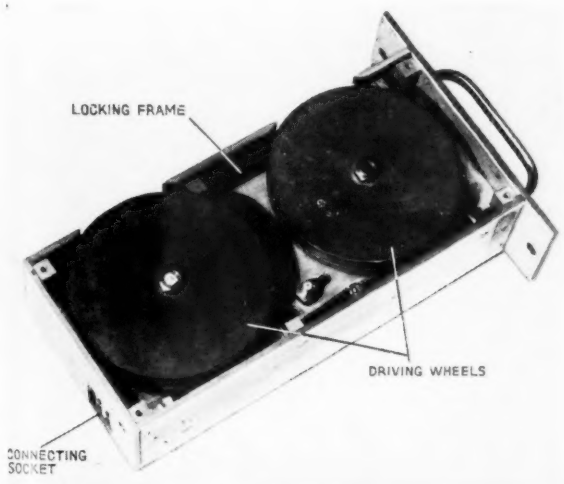
Use of Magnetic Tape

Magnetic tape recording is used to store a number of different announcements, provision being made for each to have a maximum possible duration of 45 sec., with facility for splitting it into two parts with a break of any desired time between. These features are specifically required in the case of the L.T.E. railways, where it is necessary to announce a train prior to arrival in the platform, and make a further announcement after it has arrived. The interval between them is determined by the time taken to run into the platform; there are always at least 30 sec. between the conclusion of one announcement and the start of the next. This time is used to rewind the tape on which the first announcement is recorded.

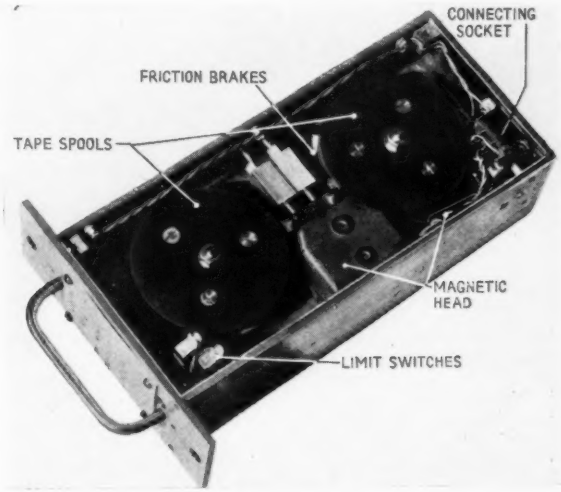
Value of Plastic Tape

Recording on plastic tape has been used because such tape has the long playing life necessary. It has a long life mechanically and a recording made on it does not deteriorate seriously after continued re-playing; moreover, the system has the advantage that recordings can be replayed as soon as made, immediately revealing any imperfections, while it is possible to erase an announcement at any time and re-record another on the same length of tape. The tape speed is approximately 25 cm. per sec. This gives a range of level frequency response up to about 4 Kc/s., with the design of magnetic head employed.

The announcements are recorded on separate lengths of tape in individually removable "cassettes," all interchangeable. The announcements can then be recorded on the tape in their cassettes at a studio remote from the announcer itself, and be sent in them to the main equipment, where no specially skilled labour is required to plug into the appropriate channels for automatic reproduction.



Left-hand side of cassette with the Bakelite cover removed



Right-hand side of cassette with the Perspex cover removed

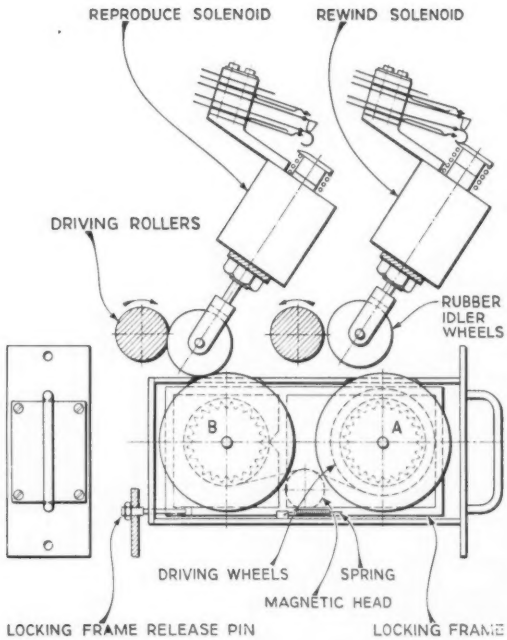


Diagram of tape cassette and driving mechanism

To change any announcements, new cassettes can be substituted in the appropriate channels, leaving the original cassettes free to be returned to the studio, for erasing and re-recording if so desired. Where different announcements are required on different days of the week, or on special occasions, spare recorded casettes can be kept with the equipment and substituted for those already in use, as and when required.

Sealed Cassettes

The accompanying photographs show these cassettes. The tape is completely sealed against dirt and dust and automatically locked when the cassette is removed from the announcing or recording equipments, to guard against its being accidentally damaged in transit, and so on.

Each contains its own Mu-metal screened triple purpose magnetic head which can be used without adjustment for recording, reproducing and erasing; moreover, once the cassette has been assembled, it is unnecessary for the magnetic head to be removed, and the problem of alignment of the magnetic gap is thereby eliminated.

The magnetic tape is wound on two spools and runs from one to the other when recording or reproducing. It is then automatically caused to rewind by limit switches incorporated in the cassettes and operating at the beginning and end of the announcement. The break in the announcement whilst the train runs into the platform is effected by stopping the motion of the tape for the required time; the point at which this occurs is determined by a recorded low frequency pulse, amplified in a frequency selective circuit and caused to operate a relay to stop the tape. This pulse is almost inaudible in the audio output of the equipment.

The chief mechanical features of a tape cassette and driving mechanism are shown in the accompanying diagram.

The tape is wound on two "Tufnol" spools and runs from spool A to spool B during recording or reproducing, and then rewinds in the reverse direction: either direction of motion is suitable for erasing. The spools are fixed to shafts which run in double ball bearings in a brass plate, which divides the cassette into two parts, enabling that part which contains the tape spools, etc., to be sealed against dust and dirt. The other ends of the shafts carry "Tufnol" driving wheels whose perimeter projects just beyond the top surface of the cassettes. The drive to the tape is transmitted through the rubber idler wheels by engaging them between the exposed parts of the driving wheels and either of the two rollers which run along the top of the cassettes and revolve continuously while the motor is running. The idler wheels are moved into engagement by solenoids which also operate contacts. Only one solenoid of a pair associated can be energised at a time.

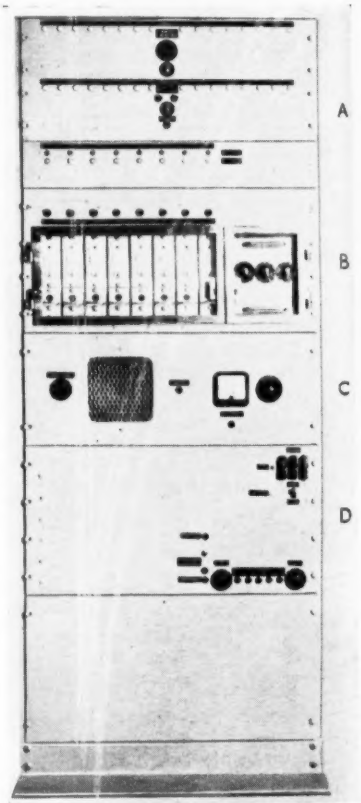
The limit switches are standard C.T.C. contacts, each arranged to close when the diameter of the roll of tape is increased to a certain critical value. This is used to operate relays, etc., to rewind the tape or disengage the drive, and so determines the maximum lengths of the announcements. It also enables small adjustments of these lengths to be made by setting the contacts.

Adjustable friction brakes are fitted to each tape spool, to prevent excessive overwind of the tape after the drive has been disengaged. When the cassettes are removed from the recording or reproducing equipment, the driving wheels are locked, preventing the tapes being unwound.

When the cassettes are plugged into the equipment, this locking becomes disengaged. Detachable bakelite covers over the driving wheels, and Perspex covers over the tape spools enable the tape to be observed without dismantling. The cassettes are normally fixed by two knurled headed screws. The announcer itself is built as a number of units, mounted on a rack and interconnected with multi-way cables. An assembly is seen in the accompanying photograph.

The equipment may be controlled through the relay control unit either automatically, by interconnection with track circuits and existing train describers, or by manual operation at the equipment itself. Control is divided into two parts, the selection of the required announcement, and initiation of the one selected; each of the circuits which perform these functions may be switched independently to automatic or manual operation, so that apart from an all-automatic or all-manual control, it is possible to use manual selection and automatic initiation, or *vice-versa*.

As soon as an announcement has been initiated, this unit can accept and indicate the selection of the one to follow, and at the same time maintain independent control of the first, until it is completed and the tape rewound; the new announcement is then immediately available for initiation. After an announcement, when the tape has been rewound, the synchronous motor which provides the drive, and the H.T. circuits to all the amplifiers are de-energised in order to increase the life of the equipment, leaving only the valve heaters and a low voltage d.c. circuit for relays, etc., still operating. When an announcement is initiated, the motor is started up and the H.T. brought on to the amplifiers. This condition is maintained until the announcement has been completed in both parts, and the tape rewound; the motor and H.T. remain energised dur-



A. Relay control unit. B. Cassette driving unit. C. Monitor unit. D. Power pack and power output amplifier unit

Eight-channel Westinghouse automatic train announcer

ing the break in the announcement. A system of lights on the relay control unit and the cassette driving unit enables it to be seen immediately which announcement is being made or rewound, and also which is the next selected announcement.

Sockets are provided into which lines to the track circuit equipment, etc., may be plugged for automatic operation. The announcement selection circuit for automatic control consists of one common line and either 8 or 16 others, corresponding to the 8 or 16 channels in the equipment. Any particular announcement can be selected by closing a circuit between common and the line associated with the required channel. There are two lines to plug-in chassis or cassettes, to facilitate servicing. The initial amplification of the signal from the magnetic head is made in a triode stage, and there is an individual triode amplifier associated with each tape cassette, each with its input transformer and other components built into a separate plug-in cassette fitting under its tape cassette. The triode stages work into a common anode load, but are all normally biased beyond cut-off. When an announcement is being made, the bias is removed from the triode associated with the channel in operation, and thus the output from the required magnetic head only is fed into the main pre-amplifier.

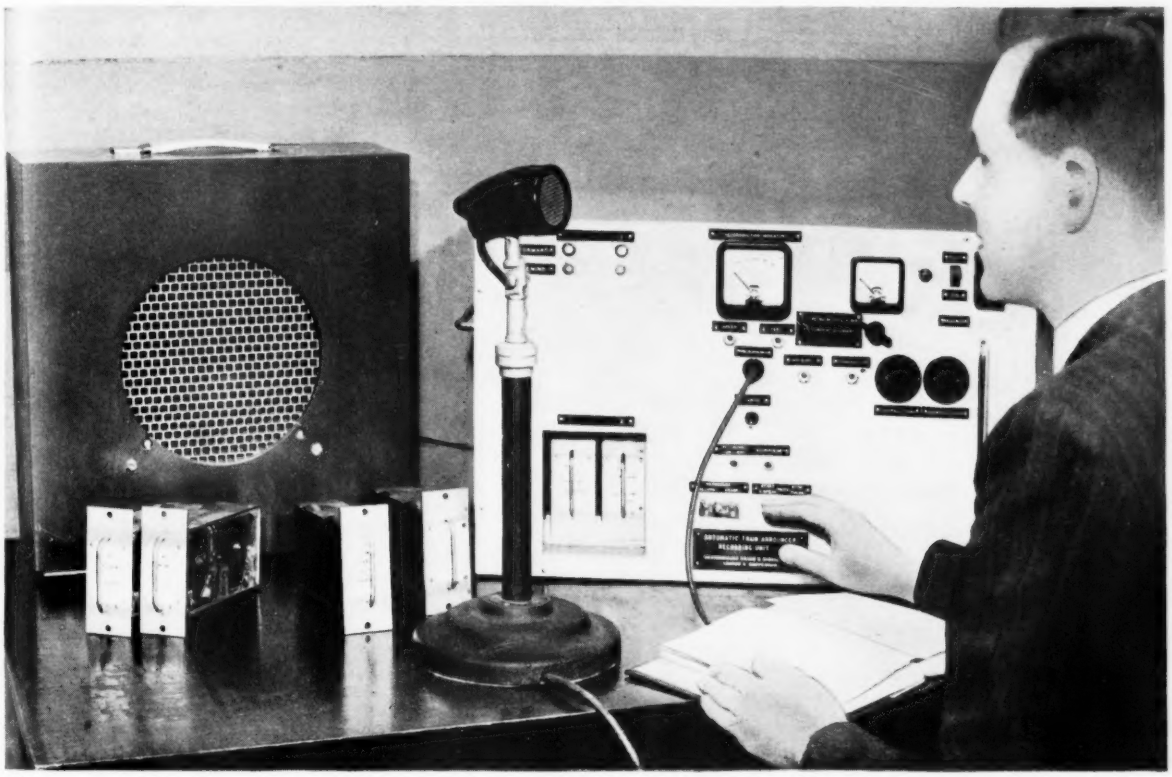
The remaining amplification takes place in the main pre-amplifier, built as a plug-in chassis. The circuit comprises a three-stage pentode amplifier which feeds the signal to the power output amplifier unit, but is followed by a low frequency amplifier and output stage operating the relay used, as already described, to stop the motion of the tape when a 50 c/s. pulse is received from its output.

The monitor unit contains an 8-in. loud speaker and volume control, which can be connected by an external jack circuit to the output of the power amplifier. A meter circuit is built into the front panel, and may be switched to record the audio output voltage of the power amplifier, or for use with further external jack circuits for checking the operating conditions at various different points.

The power output amplifier has a class "A" push-pull triode output stage, capable of delivering a peak power of 50 watts into a 200 ohm load. It is also designed with a frequency response which cuts off sharply below 500 c/s. in order to increase the intelligibility of announcements made from loudspeakers of the usual railway platform type. A microphone pre-amplifier is incorporated, with provision if necessary for remote control switching from recorded to "live" announcements.

In order to achieve the greatest possible reliability, metal rectifiers and paper condensers have been used exclusively in the construction of the power pack and all the amplifiers, with the one exception that large electrolytic condensers have been necessary in a low voltage d.c. circuit providing energisation for relays, etc., though all these condensers are operated at less than half their rated peak working voltage.

The power supply required is 200 volts 33⅓ c/s. three-phase, but the equipment may be arranged to operate from a similar 50 c/s. supply.



Westinghouse automatic train announcer recording unit in operation

the automatic remote control initiation circuits, and announcements are initiated by short-circuiting them to earth. One line is used for initiating the first part of the announcement, the other for the second; interlocking is provided to ensure that the sequence cannot be reversed.

Cassette Driving Unit

The recorded tape cassettes are normally plugged into the cassette driving unit, which houses the synchronous motor, the driving rollers and the solenoids. This unit also contains the relay circuits associated with the automatic stop and rewind functions, pre-amplifiers, etc.

The amplifiers are all constructed as

Automatic Recording

In addition to the reproducing equipment already described, a recording unit has also been developed for use in the studios where the announcements would

(*Continued on page* 189)

Reconstruction of Argenteuil Bridge

A bridge destroyed in two wars, rebuilt to a design substantially that of its 70-year old predecessor

Argenteuil Bridge in 1944 *before construction of temporary pile bridge*

JUST before reaching Argenteuil Station, the Paris-Mantes main line of the French National Railways crosses the River Seine on a steel bridge 639 ft. long, consisting of three central spans of 142 ft. and two flanking spans of 106½ ft. Twice in its history this bridge has fallen victim to wartime destruction, in 1870 and in 1944. The double-track line carries important suburban traffic and also long-distance traffic *via* Mantes to Normandy. For long-distance traffic, a second line between Paris and Mantes is available on the left bank of the Seine. The permanent reconstruction of Argenteuil Bridge was not regarded as of the highest priority. A temporary bridge was thrown across the river in May, 1945, and remained in service, despite serious shortcomings, until the new permanent bridge was opened for traffic in July, 1949. Both the temporary and the permanent bridge are described by Monsieur J. Cauvy, Civil Engineer, Western Region, French National Railways, in the March, 1950, issue of *La Technique Moderne—Construction.*

The 1945 temporary bridge was built on piling beside the ruins of the wrecked bridge. The pile bridge, which was at a height of 50 ft. above the water level and 75 ft. above the river bed, consisted of a series of steel spans of different types, resting either direct on reinforced concrete slabs capping the pile heads or on steel trestling, which in turn rested on concrete slabs. The spans for the first track were brought into position by launching on bogies and those for the second track were placed by cranes travelling on the first track. The work was carried out by the steel contractors, Baudet-Donon-Roussel, and the civil engineering contractors, Nord. Some of the plant was placed at their disposal by the American Army. The first track was in operation in May, 1945.

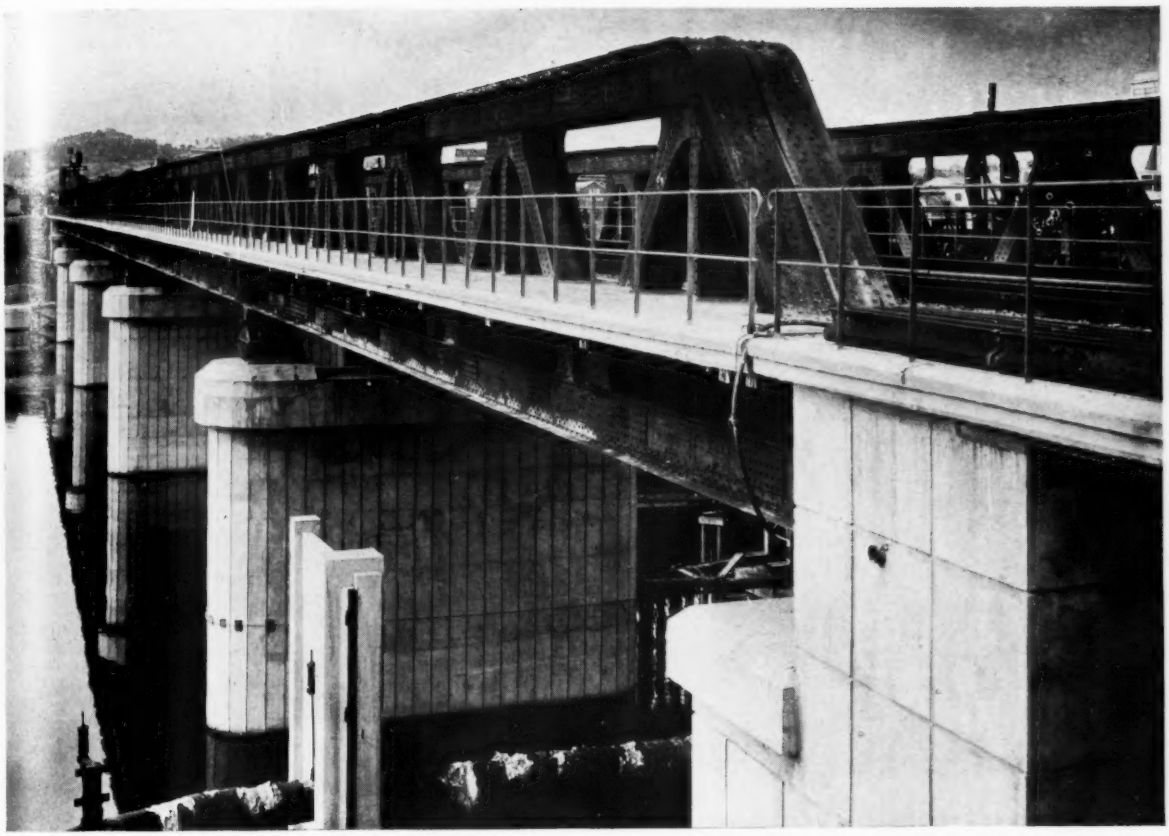
During its four years of life, the temporary bridge needed heavy and continuous maintenance work, as the wooden piles were affected by rot. The first piles to be affected were those on one bank, which were subsequently embedded in a protective layer of concrete and partially replaced by brick pillars. In 1948, the mid-river piles were on examination also found to be seriously affected by rot. The parts most affected were at about 2 ft. above the mean water level, and were replaced, one by one, by new pile sections, spliced to the unaffected parts of the old piles.

Height Limitations

The new permanent bridge was built to a design similar to that of the old bridge as the existing foundations of abutments and piers were still intact. In view of the proximity of Argenteuil Station, and the headroom required for shipping, there was no possibility of increasing the structural height of the bridge and track, so that the previous design of a through bridge with lateral truss girders had to be adopted again.

The concrete-filled cast-iron columns which served as piers of the old bridge, were stripped down under the protection of sheet piling to about 3 ft. above the river bed and capped with reinforced concrete to carry the new piers. These piers consist of two columns of reinforced concrete linked by thin walls of the same material so that the pier has the appearance of a solid concrete pier. The abutments were reconstructed largely to the former design. These works were carried out in 1947 by Entreprises Monod.

Permanent bridge under construction, showing abutments formed by two reinforced-concrete columns linked by walls



Completed bridge at Argenteuil, showing V-truss girder construction and cantilever footway on steel brackets supporting reinforced-concrete deck

The steel superstructure consists of twin through truss girders. The cross-girders are spaced 10 ft. 8 in. apart. They connect alternately with the bottom-flange panel points, and, by means of verticals, with the top flange panel points. The track ballast is spread on a reinforced concrete slab deck resting on the cross-girders and stringers. A cantilever footway is mounted on steel brackets capped by a reinforced-concrete deck which includes channels for electric cables.

The launching of the steel structure across the piers was carried out with great precision by means of an elaborate arrangement of electrically-operated tackle working at about 50 ft. an hour. The work was handicapped to some extent by the lack of storage space between the bridge and Argenteuil Station. This made it necessary to maintain a strict timetable for the delivery of the steel parts.

TENSILE TESTING OF METALS, B.S.18:1950, is the fourth revision of the British Standard which was first published in 1904. With the exception of the definition of proof stress the standard has not been fundamentally altered. The definition of proof stress now adopted is, however, quite different from that contained in previous issues, as it has been amended to bring it in line with the practice of obtaining proof stress under load. Copies may be obtained from the British Standards Institution, Sales Department, 24, Victoria Street, London, S.W.1, price 2s. 6d.

FIRST NATIONAL TRAFFIC CENSUS SINCE 1938.—The first national traffic census by the Ministry of Transport since 1938 is taking place this week from August 14 to 20. Its purpose is to determine the growth and trend of modern traffic, and, particularly, any changes which may have occurred in the general traffic pattern since the war. Because of the need for economy and shortage of labour, the census is on a smaller scale than before the war, when traffic counts were taken periodically at three-year intervals at some 5,000 points on Class I and about 4,000 points on Class II roads. The present census is being taken at 270 points as widely distributed as possible to cover all classes of traffic in industrial and country areas.

ROAD-RAIL TOURS IN FRANCE.—To foster co-ordination of road and rail passenger traffic, the French National Railways have introduced special combined road-rail tickets between Paris and the Riviera at much reduced rates. Fares vary from less than 1d. a mile to nearly 2d. a mile, according to the class of travel. Travel to the south is by speedy and comfortable express trains, and modern motor coaches complete the journey through the Alps. Three different routes are available for the road journey across the Alps, with return along the coast between Nice and Marseilles by road or rail, according to the itinerary selected.

HACKBRIDGE & HEWITTIC.—In his circulated statement at the annual general meeting of the Hackbridge & Hewittic Electric Co. Ltd., Mr. T. F. Lister, Chairman & Managing Director, remarked that the increase in output last year had been more than maintained, with the result that there was a net profit, after allowing for taxes, of £121,213, to which had to be added the net profit of £13,803 from the Canadian subsidiary, making a total of £135,016, as compared with £74,310 for the previous year. These results were a record for the company and had been achieved as a direct result of expanded production. They were able to bring the extensions to the factory at Hersham into full production towards the end of 1949, and considerable benefit was now being reaped from the extra space and improved working conditions.

NEW WAGE CLAIMS ON C.I.E.—The National Union of Railwaymen in Ireland has submitted to the board of Coras Iompair Eireann a programme covering new wage claims and working conditions for its members in all sections of C.I.E.; the claim is being considered by the board. The Irish Transport & General Workers' Union has also submitted a demand for a wage increase of 22s. a week for the operative grades in Coras Iompair Eireann, with increased lodging allowances; it also demands that existing wage differentials be maintained.

The "Royal Scot"—Steam and Diesel

Steam-hauled down "Royal Scot" near Bushey, drawn by Stanier "7P" class express passenger 4–6–2 locomotive No. 46221, "Queen Elizabeth"

Up "Royal Scot" passing Tring Station, Herts., drawn by London Midland Region twin diesel-electric units Nos. 10000 and 10001

RAILWAY NEWS SECTION

PERSONAL

MR. BARNES VISITING GERMANY

Mr. Alfred Barnes, Minister of Transport, is making a short visit to Germany to inspect German *autobahnen* and railway and canal systems. Mr. Barnes, who is meeting British, American, and German transport officials, left Harwich on August 14, and will be away for 10 days. The tour includes visits to Cologne, Hanover, Berlin, Frankfurt, Düsseldorf, and the Ruhr.

Mr. K. S. Peacock has been appointed Deputy Chairman of Guest, Keen & Nettlefolds Limited.

Mr. A. W. Damon, Outdoor Assistant, Signal & Telecommunications Department, British Railways, Southern Region, has been appointed Assistant Signal & Telecommunications Engineer in succession to Mr. R. Cogger, who has retired.

We regret to record the death on August 15, of Mr. Francis Lydall, B.A., B.Sc., M.I.E.E., M.Inst.T., consultant to Messrs. Merz & McLellan, and to that firm's Indian and South African interests. Mr. Lydall was associated with a number of railway electrification schemes.

Mr. R. J. Ellery, M.Inst.T., Secretary of the British Electric Traction Co. Ltd., who has been in South Africa since the beginning of the year, in connection with certain of the company's interests there, will be leaving the Union towards the end of this month and expects to be at B.E.T. headquarters early in September.

Mr. E. W. Marten, B.Sc. (Eng.), A.M.I.C.E., M.I.Loco.E., Managing Director of Associated Locomotive Equipment Limited, and a Director of W. G. Bagnall Limited, has returned from a round the world tour during which he has travelled some 50,000 miles, mostly by air. The countries he has visited have included Egypt, Pakistan, India, Australia, New Zealand, and the United States. As we recorded in our June 2 issue, his tour was on behalf of both the Brush group and the Heenan & Froude group of companies.

We regret to record the death on August 14, at the age of 87, of Mr. Orlando M. Doy, one-time Director & Secretary of Pickfords Limited, and Secretary of Carter Paterson & Co. Ltd.

We regret to record the death on August 14, at the age of 74, of Colonel Sir William Charles Wright, Bt., G.B.E., C.B., one-time Chairman of Baldwins (Holdings) Limited, Director of Guest Keen Baldwins Iron & Steel Co. Ltd., and of Richard Thomas & Baldwins Limited. He acted as Controller of Iron & Steel for a number of years during both the 1914-18 and the 1939-45 wars.

Mrs. Ella Gasking, O.B.E., who, as recorded in our June 16 issue, has been appointed a Whole-Time Member of the Hotels Executive, British Transport Commission, has been serving as a Part-Time Member of the Hotels Executive since its inception in May, 1948. She was born at Sheffield, and for over thirty years was Chairman & Managing Director of Batchelor's Peas Limited. Mrs. Gasking has held various important positions with organisations in the food industry, being Chairman of the Fruit & Vegetable Canners' Association during the whole period of the second world war; a Member of the wartime Canners' Association, and of Candisco, a Government-controlled body for the distribution of beans in sauce. For the past four years she was a Member of the Central Price Regulation Committee of the Board of Trade, and was awarded the O.B.E. in 1948.

Mrs. Ella Gasking

Appointed a Whole-Time Member of the Hotels Executive, British Transport Commission

Sir John Anderson has been elected President of the British Standards Institution for the coming year.

The following promotions were gazetted recently under the heading of Regular Army Reserve of Officers — Royal Engineers:—

Captains to be Majors: A. H. Cantrell, B.Sc., A.M.I.C.E., January 1, 1949; E. L. Triffitt, B.A., A.M.I.C.E., January 1, 1949.

Lieutenant to be Major: J. Ratter, C.B.E., B.Sc., January 1, 1949.

OUDH TIRHUT STATE RAILWAY

Mr. P. G. C. Peyton, M.I.Loco.E., previously Deputy Chief Mechanical Engineer (Works), South Indian Railway, has been appointed Chief Mechanical Engineer of the Oudh Tirhut State Railway. Mr. Sidney Smith, O.B.E., previously Chairman, General Rules Committee, Indian Railway Board, has been appointed Traffic Manager, Oudh Tirhut State Railway.

Sir John James has relinquished his directorship of Richard Thomas & Baldwins Limited.

Mr. H. Healey, General Agent in Bristol for the Canadian Pacific Railway, has retired, and is succeeded by Mr. G. W. Murrell, previously Passenger Agent, Bristol.

Mr. A. J. Romer has been appointed to the board of A.E.C. Limited and to the office of Managing Director, as from October 1. The appointment carries with it election to the board of the parent company of the A.C.V. group, Associated Commercial Vehicles Limited.

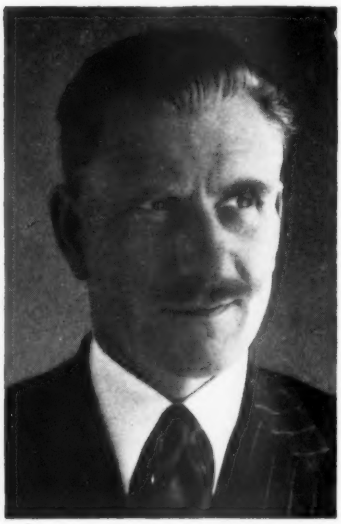
Mr. L. J. Stokoe has been appointed Secretary of the Scottish Area of the Road Haulage Association in place of Mr. D. C. Cranston.

We regret to record the death on August 1, at the age of 78, of Mr. W. L. Crighton, formerly Assistant Manager, Advertising Bureau, Canadian National Railways, Montreal. Mr. Crighton was born at Derby, England, and became Advertising Agent of the Intercolonial Railway at Moncton in 1901. He was appointed General Advertising Agent for the Canadian National Railways at Toronto in 1919, and went to Montreal in 1923 as Assistant Manager, Advertising Bureau, for the Canadian National system, from which post he retired in 1930.

Mr. B. A. Coulson, Assistant to District Goods Manager, Leeds, British Railways, North Eastern Region, who, as recorded in our August 11 issue, has been appointed Assistant (Cartage Working), Office of the Commerical Superintendent, Eastern Region, Liverpool Street, was educated at Queen's College, Oxford, and entered the service of the L.N.E.R. in 1934 as a traffic apprentice. On completion of the usual period of training, he was appointed Supernumerary Assistant Yardmaster at Carlisle in March, 1938, and in December of the same year, he was transferred to the Office of the Chief General Manager. In 1940, Mr. Coulson went to the Office of the District Goods Manager, Edinburgh, and became Goods Agent at Retford in 1946 and Assistant to the District Goods Manager, Leeds, in 1948. He served with the Royal Engineers (Movement Control) from 1941 to 1946, during which time he was Mentioned in Despatches and was demobilised with the rank of Lt.-Colonel.

Mr. D. R. Fraser

Appointed Assistant (Budget, etc., Matters), Railway Executive Headquarters



Mr. C. R. L. Rice

Appointed District Motive Power Superintendent, Old Oak Common, Western Region, British Railways

Mr. J. B. Burnell

Who has assumed responsibility for London Transport Central Bus and Tram & Trolleybus Operating Sections

Mr. D. R. Fraser, Senior Investigator, Accountant's Department, British Railways, London Midland Region, who, as recorded in our July 28 issue, has been appointed Assistant (Budget, etc., matters), Railway Executive headquarters, was educated at Dingwall Academy and joined the Highland Railway in the Accounts Department at Inverness in 1914. He served in the Artillery in France from 1915 to 1919, and in 1927 was appointed to Crewe as Head of Manufacturing Costs Section, Locomotive Accounts Office of the L.M.S.R. He became Works Accountant for the Central Division of the L.M.S.R. at Horwich, in 1930 and in 1938 was appointed Head of the Investigation Section, responsible directly to the President. During the war, Mr. Fraser was a Member of the Redundant Assets and Engineering Salvage Committees, which were engaged in an intensive campaign for the reclamation of materials.

Mr. A. O. Wolff, Engineer, Maintenance of Way, Eastern Region, Canadian Pacific Railway, has retired, and has been succeeded by Mr. G. W. Miller, Assistant Engineer, Maintenance of Way. Mr. Miller is a Director of the American Railway Engineering Association.

Mr. W. Gildon, who has held the position of Chief Purchasing Officer of the B.E.T. Federation Limited since 1933, has retired from the service of the Federation and has been succeeded by Mr. K. C. Wheatley, previously Principal Assistant in the Department.

PRESENTATIONS TO MR. P. R. ANGUS

A presentation to Mr. P. R. Angus, Chief Mechanical Engineer, New Zealand Government Railways, was made recently at Wellington to mark the occasion of his retirement. The function was attended by Mr. F. W. Aickin, General Manager of Railways and a number of Executive Officers. A further presentation to Mr. Angus was made by Officers of the Locomotive & Workshops Branch.

Mr. H. S. Holbrook, B.Sc., M.I.E.E., Fel.A.I.E.E., has relinquished the Managership of the Transformer Engineering Department of the British Thomson-Houston Co. Ltd., on being appointed Consulting Engineer on Transformers. Mr. K. M. McBain, M.I.Mech.E., M.I.E.E., Mem.A.I.E.E., latterly Chief Assistant to Mr. Holbrook, has been appointed Manager of the Transformer Engineering Department.

Mr. C. R. L. Rice, District Locomotive Superintendent, Willesden (London) Depot, British Railways, London Midland Region, who has been appointed District Motive Power Superintendent, Old Oak Common (London) Depot, Western Region, began his railway career at the L.M.S.R. Horwich Works. In 1930 he was placed in charge of the motive power depot at Stratford-on-Avon and in 1932 he moved to Carlton in a similar capacity; two years later Mr. Rice became Head Office Inspector at Derby. He was appointed Assistant District Locomotive Superintendent at Saltley in 1938, and was transferred to Manchester in 1943. Three years later Mr. Rice was appointed District Locomotive Superintendent at Willesden (London) Depot.

Dr. C. Sykes, Director of Research of the Brown-Firth Research Laboratories, has retired from the Chairmanship of the Divisional Panel of the Metallurgy Division of the British Iron & Steel Research Association, and has been succeeded by Mr. W. Barr, Chief Metallurgist of Colvilles Limited. Mr. G. H. Johnson, Managing Director of the Kettering Iron & Coal Co. Ltd., has retired from the Chairmanship of the Divisional Panel of the Iron Making Division of B.I.S.R.A. and Mr. W. C. Bell, Joint Director of Research of Stewarts and Lloyds Limited, has accepted the Chairmanship. Mr. Johnson has agreed to act as Deputy Chairman for the period of a year.

Mr. J. B. Burnell, M.Inst.T., Operating Manager (Central Road Services), London Transport Executive, who, as recorded in our July 21 issue, has assumed responsibility for the single organisation under which the Central Bus and Tram & Trolleybus operating sections have been amalgamated, was born in 1898 and entered the Royal Navy in 1911. He served with the Grand Fleet and in the Submarine Service during the 1914-18 War and retired from the Navy in 1925 with the rank of Lt.-Commander. He joined the London General Omnibus Company in 1926 as a traffic observer and became a depot superintendent in 1931. After serving as Staff Assistant in the London Transport Country Bus & Coach Department and as Assistant Staff Superintendent for all road services, he became Divisional Superintendent (Eastern Division) in 1940. He was made Operating Manager (Central Buses) in 1945 and Operating Manager (Central Road Services) in 1948. The new organisation under Mr. Burnell covers all road services in the Central Area and has been introduced in connection with the South London tram conversion programme, which is scheduled to commence in October.

Mr. F. Havers, District Goods Superintendent, Reading, British Railways, Western Region, who, as recorded in our July 21 issue, has been appointed Assistant to the Commercial Superintendent (Mineral), Paddington Station, joined the G.W.R. at the Norwich District Agent's Office in 1913 and served in the R.F.C. during the first world war. He rejoined the G.W.R. in the Office of the Chief Goods Manager at Paddington and in 1921 was selected for a special training scheme. Mr. Havers served at Newport from 1932 until 1937, when he was appointed Goods Agent at Slough, and later held a similar position at Handsworth & Smethwick. In 1942 he was transferred to Bristol as Chief Clerk to the Goods Superintendent, and two years later moved to Birmingham as Chief Clerk to the District Goods Manager. He was later appointed Goods Agent at Birkenhead and Liverpool, and returned in 1947 to the Commercial Superintendent's Office at Paddington as Assistant Development Agent. He was appointed District Goods Superintendent, Reading, in 1949. Mr. Havers is a Member of the Council of the Institute of Transport, serving on the Examinations and Scholarships Committee; he is a Brunel Medallist of the London School of Economics and is also a Silver Medallist of the Institute of Transport.

Ministry of Transport Accident Report

Strathmiglo, British Railways, Scottish Region, November 27, 1949

Colonel R. J. Walker, Inspecting Officer of Railways, Ministry of Transport, inquired into the accident which occurred at about 7.40 a.m. on Sunday, November 27, 1949, on the single line between Strathmiglo and Gateside, in Fife, when a loaded ballast train, consisting of two empty rail and sleeper wagons, six wagons loaded with ashes, engineer's coach, and brake van, drawn by an 0-6-0 tender engine and proceeding to some relaying operations, reached the site at the moment when one rail-length of track, including sleepers, had been removed. The engine and tender plunged into the bare formation.

The driver, in attempting to jump clear, was trapped between the two, a leg being practically severed, so that he died within a few minutes of being released. Ten other railwaymen on the train were slightly injured; skilled help was quickly summoned. Damage to the train was superficial. The weather was fine and clear with visibility restricted to about 250 yd. in the half light of morning. No flagman had been sent out to protect the work.

Light Traffic

Traffic is very light on this line and it is closed on Sundays. It is worked on the electric token system, with sections between Ladybank and Auchtermuchty, and Auchtermuchty and Mawcarse. Strathmiglo and Gateside are not token block posts. In clear daylight an approaching train can first be seen from Corstanmill, the site of the accident, as it passes under an overbridge after leaving Strathmiglo Station, itself about 1,190 yd. away. Relaying operations had been planned for three points between Ladybank and Mawcarse, of which those at Corstanmill were scheduled for the day in question. The notices for this job had been properly issued and, as some spare labour had become available, a start was made with this work on the previous Friday and the permanent way inspector in charge took the usual steps for the protection of it under Rule 217, later posting a flagman and erecting "C" and "T" indicators in accordance with Rule 218. After the last train passed on the Saturday the flagman was withdrawn, but the indicators were left in position and lighted.

The senior driver in charge at Ladybank shed had extracted the relevant items from the notices and chalked them on a blackboard for the guidance of enginemen.

On the Sunday morning the train left at 7.17 a.m. and slowed down nearly to a stand at Auchtermuchty signal box at 7.27, where it was cautioned by a green hand signal. As the tokens were exchanged the fireman was informed that they were to stop at the platform to pick up some of the gang, which was done. The train proceeded to Strathmiglo, but there was nobody to be picked up there and it continued forward. Approaching Corstanmill the fireman suddenly saw the figure of the permanent way inspector in the right-hand cess running towards the train waving his arms and shouting. He at once informed the driver, who closed the regulator and applied the steam brake, while he himself applied the hand brake. They ran into the gap, about 150 yd. from where the inspector was first seen.

The signalman at Auchtermuchty did not know, without referring to the notices, exactly where the work was taking place and had not been informed when he cautioned the train into the section, that the line was not clear or that the rails had been lifted.

The fireman was satisfied that the engine was in good order and thought he heard the guard tell the driver at Ladybank that the work was between Auchtermuchty and Gateside, but was not certain. The first indication that anything was wrong was sighting the inspector, when speed was between 15 and 20 m.p.h.

The guard had known for some time about the three re-sleepering works and earlier in the week was surprised to find the middle job completed, as he thought it was for that one that his train was wanted on Sunday, but after discussion with the driver and inspector realised the position. Discussing the matter again with the driver on the Friday, they agreed that they probably would have to stop at the far end of the work, nearer Gateside. It was quite usual on a Sunday to find some of the gang already on the site, but he would not expect to find rails removed. He knew that some of the men would be going there by road, but would have expected a responsible member of the engineering staff to be on the train to pilot it.

Another guard, travelling in the engineer's coach, thought the train was running a little too fast to stop at the near end of the job and went to the window, when he saw the inspector holding up his hands. Speed might have been about 30 m.p.h. After the accident he telephoned from the nearby farm for help.

The acting permanent way inspector had been 29 years on the railway and was 48 years old. He said the jobs had been started before the planned time because two relaying gangs had become available. He had protected one of the others properly, although the notice did not refer to removing rails, by putting out flagmen in accordance with Rule 217 (a) and (e) and had correctly protected this particular one on the two preceding days, in accordance with Rule 218, as stated above. He had not erected any warning boards, as the work had not appeared in any notices for those days (Rule 218 (d)).

It was too dark to start work when the gang arrived on Sunday, but at 7.30 a.m. he gave orders for that to be done and the rails to be taken out. Shortly after he heard the train coming under the bridge and realised he had forgotten to put out flagmen and protect the work by boards. He had no flags or detonators with him and was unable to find any quickly, so ran towards the train, hoping to be able to stop it.

Inspecting Officer's Conclusion

This accident was caused by the failure of the inspector to take the fundamental precaution of putting out hand-signalmen. He acknowledged this with complete frankness and admitted that he quite forgot about it, although he knew the ballast train was coming. In addition, he appeared to have made no effort to co-operate with the signalman or train crew by giving them information of his requirements, nor did he arrange for any of the engineering staff travelling on the train to guide it.

Colonel Walker finds it surprising that a man of his good record and years of experience should fail in this way and omit to take precautions which one might have expected to be almost instinctive. In fairness, however, it must be stated that it is difficult to understand why the train was travelling at such a high speed. Had it approached more cautiously in the uncertain light, as it perhaps should have done, the accident might not have occurred. On a rising gradient of 1 in 100, had the train been running at 15 to 20 m.p.h., it should have been able to stop in about 100 yd. and longer warning was almost certainly given. The driver knew exactly to which job he was going, but possibly the wording of the notice, coupled with the conversation with the guard, may have produced the pre-conceived idea that he was expected to go right through to the top end.

Colonel Walker makes no recommendation. Rules 217 and 218 are adequate and clearly worded and there should be no difficulty in understanding them.

Automatic Train Announcing Apparatus

(*Concluded from page* 183)

be recorded for a number of reproducing equipments.

Its main features are that the tape cassettes can be plugged directly, and without any modification, into the equipment, and an announcement can then be recorded; the tape is automatically rewound, etc., by the operation of the limit switches, as in the announcer. When the rewind is complete, the recorded announcement can be played back, enabling any imperfections to be noticed at once. If the recording is unsatisfactory, the announcement can be erased and a new one recorded. A circuit is provided for recording 50 c/s. pulses used, as described, to divide the announcements into two parts.

These functions are controlled from two key switches; the remaining controls need to be used only when setting up the equipment, or when there are changes in the recording conditions, and so on.

This unit is self-contained operating on 230 volts 50 c/s., single phase, with suitable motor. An electronic time indicator is energised at the beginning of each recording and indicates the time elapsed, on a standard 1 mA. meter calibrated to read 0 to 60 seconds.

The amplifier, which comprises three stages of voltage amplification with a tetrode output stage, is used both for recording and reproducing, though its frequency response characteristics are suitably corrected for each of these three functions by switching in appropriate networks in the amplifier chain.

The amplifier gain when used for recording is designed to fall off rapidly at low frequencies, as not only are these frequencies unnecessary in the announcements, and in fact also attenuated in the announcer itself, but their absence eliminates the possibility of recorded low frequency speech signals operating the automatic stop circuit other than when required.

A 40 kc/s. tetrode oscillator provides both the erasing H.F. and the H.F. recording bias, with separate pre-set controls for each.

A second meter is included on the front panel of the equipment and can be switched to measure audio recording current, high frequency "bias" current for recording, and erasing current.

Paris Metropolitan Railway Progress

Well-arranged exhibition to mark the jubilee of the system

The Paris Metropolitan Exhibition, held in the Musée des Arts Modernes, formed part of the programme organised by the R.A.T.P. (Régie Autonome des Transports Parisiens) for the celebration of the fiftieth anniversary of the opening of the first underground line, from the Porte de Vincennes to the Porte Maillot, on July 19, 1900. The exhibits illustrated the history of the Metro from the first plans of 1855 to the present day. The exhibition, which many visitors have thought worthy of a permanent place in the museum, closed on July 30, 1950.

Prominent among the exhibits were models of rolling stock, including a model of the original Metro trains, which consisted of three wooden coaches, another of the present five-car trains, and the third of new trains which are now under construction.

Many of the existing trains have been running for nearly 40 years. Strongly built, they have stood up well to the heavy overloading of the war years and since, particularly in the winter of 1945-1946, when the traffic was 125 per cent. greater than in the winter of 1938-1939. The need for additional rolling stock on Metro extensions has led to a revision of the technical principles required in new material for operating economically under present and future conditions. At present trains of five cars—two motors and three trailers—are crowded in the rush hours, but often sparsely occupied at other times. In such hours the trains are run for economy at longer intervals.

More Frequent Services

To maintain a more frequent service at all times, the R.A.T.P. has decided on trains of six instead of five coaches. They are to be made up of two independent units, automatically coupled, each consisting of three coach bodies mounted on four articulated bogies, thus saving weight. Two of the four bogies are motor driven. The steel coupling is rectangular in section, small and compact, but containing the electric and compressed air ducts. An impression of the new stock appears in the illustration above.

In the slack hours, uncoupled units are to run as independent short trains giving quick service. The new coaches will have more and wider sliding doors, closing automatically and opening easily. A considerable saving of weight is planned in the new coach bodies, but light alloys are not to be used, except in some interior fittings. Strong welded exterior steel sheets will give great rigidity to the construction. A saving of 30 to 40 per cent. in weight is expected in comparison with the old rolling stock.

New Rolling Stock

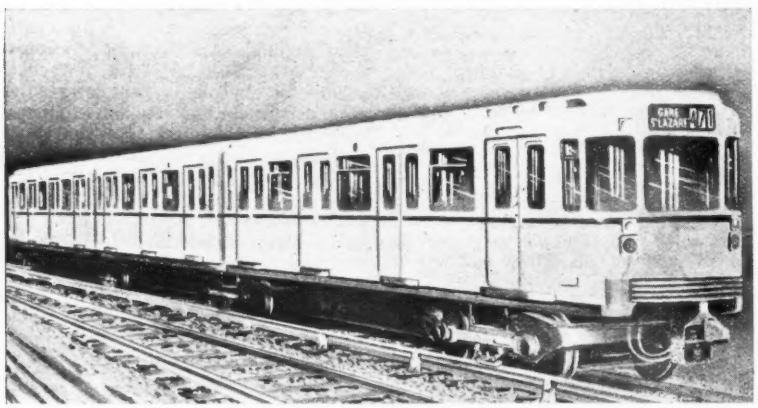
A full-size model of a new coach was also on view. In the driving cabin, when not in use, an interior door is closed to prevent access to the controls, and the space is then available for passengers. The coaches are lighted by fluorescent tubes. Rubber is used to reduce noise in certain moving parts.

The R.A.T.P. has now 40 train units under construction. Some may be tried out on Line 13 when the recently-completed extension from Porte St. Ouen to Carrefour Pleyel is opened, but no decision on this point has yet been taken. The Paris Metropolitan will operate the Vincennes line of the S.N.C.F. when this is electrified. Work has begun on the abolition of level crossings. At the request of the Metropolitan, the S.N.C.F. adopted a standard height of one metre for platforms, giving easy access to coaches at platform level.

New rolling stock is planned for the Sceaux and Vincennes suburban lines. The new material will be standardised, thus making it possible to complete a suburban system around Paris when the planned transversal underground lines, Nord-Sud and Est-Ouest, across Paris connecting the suburban lines, are eventually constructed.

Another exhibit attracting special attention was a model of the Sceaux electrified line, actually used by the Paris Metropolitan for the instruction of train crews. Two-unit trains are run from the terminal station (Luxembourg) around a complete circuit. The trains automatically stop at stations *en route* and the signalling changes as in actual service.

A vivid plan of the Metro executed in relief was an interesting feature. The entire system of 14 lines was represented by a luminous green liquid and bubbles flowing in glass tubes through the city and suburbs. The Seine was seen as a broad band in blue passing under the bridges. The Eiffel Tower, Arc de Triomphe, Sacré-Coeur on the heights of Montmartre, the Louvre and many other notable landmarks were also shown.



Impression of new three-car articulated set now under construction for the Paris Metropolitan Railway

San Paulo (Brazilian) Railway Co. Ltd.

The report for the year ended December 31, 1949, of the San Paulo (Brazilian) Railway Co. Ltd. shows a loss in Brazil of £128,357, which after adjustment for administrative expenses and receipts in England gives a debit of £152,991 against the net revenue account. Including the balance of £195,933 brought forward, interest on deposits and investments, and transfer of £325,000 from general reserve, the sum available in net revenue account is £541,785. After charging final interest on debentures, general interest, a provision against interests in subsidiaries and preference dividend at 5 per cent., less tax, for the period from January 1 to July 25, 1949, there remains a balance of £67,412 to be carried forward.

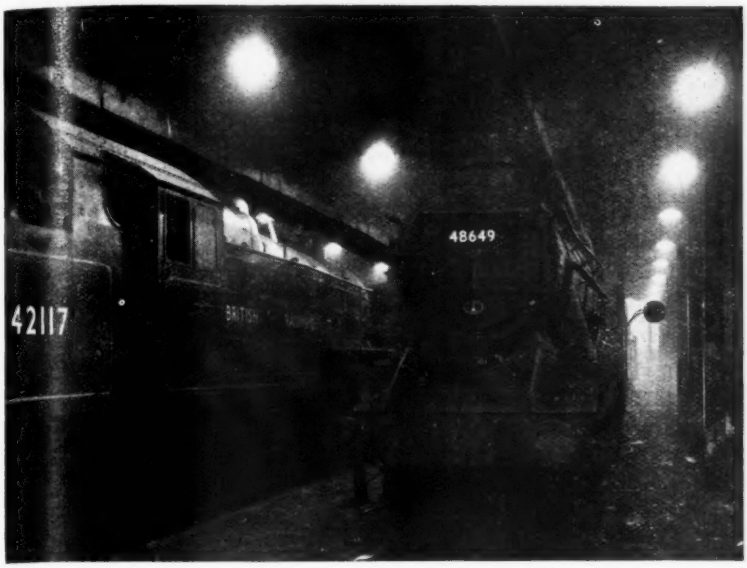
In his statement circulated with the report and accounts, the Chairman, Lt.-Colonel C. O. H. Bury, states that the instrument of cession transferring ownership of the Bragantina Railway, has been signed. All vehicles and other assets of the company's road motor undertaking have been sold; in the case, however, of the road company staff, not only were large sums paid as indemnity, but dismissed staff have repudiated their discharge agreements and are suing the company for further compensation. Land sales of the subsidiary, Companhia Fazenda Belem, have been satisfactory. Since the end of the year, the sale of the printing works of the E.F.S.J. (Santos-Jundiai Railway) has been completed, but here again a large personnel indemnity has had to be paid. The price received by the Companhia Fazenda Belem for the printing works was much in excess of the figure at which the whole of the land and buildings stand in the books.

The Brazilian Federal Treasury has paid the equivalent of £988,381 in reimbursement for rolling stock and stores supplied since disappropriation, which has enabled the company to liquidate liabilities in Brazil and provide for future possible liabilities. There is, states Colonel Bury, still a sum outstanding against the Brazilian Government of £334,503, for rolling stock and stores supplied, which it is hoped to realise at an early date. As to the company's claim for unrecognised capital, progress has been made through the various Brazilian Government departments concerned, but the forthcoming presidential election appears to be distracting the authorities, and has added to the difficulties of the negotiations which are still being pursued.

EAST INDIAN RAIL ACCIDENT.—Twenty-three persons are stated to have been killed and about 200 injured when a Delhi to Calcutta express collided with a derailed goods train near Banaras (Benares) early on August 13. The engine and four carriages fell down an embankment, coming to rest in 4 ft. of flood water, which hampered rescue work. The goods train had become derailed on a bridge where, according to an agency report, the track had been tampered with.

Lighting at Willesden Motive Power Depot

Specially-designed fittings to obviate corrosion and keep out moisture



An improved general lighting scheme, using 125 fittings of a type specially designed for service in locomotive sheds, has been installed in the running shed at Willesden Motive Power Depot, London Midland Region. The design of the fitting was evolved as a result of collaboration between the Civil Engineer's Department, London Midland Region, and the General Electric Co. Ltd., the principal objects being to guard against corrosion and the entry of moisture.

In the Willesden installation the fittings are suspended at a height of 15 ft. in rows between the shed roads with a 15 ft. spacing between fittings and between rows. Fittings in adjacent rows are staggered to give even illumination over the whole area. Two switches, controlling alternate lamps, are provided for each row of fittings, so that either half or full lighting may be used.

The type of fitting used has a die-cast aluminium body, pyluminised, and painted with two coats of enamel. It is the practice on the London Midland Region to apply a top coat of bitumastic paint on installation. The interior of the fitting is stove-enamelled white, and the lamp itself is protected from the outside atmosphere by a clear-glass visor cemented to a hinged ring, which is secured to the body in the closed position by captive winged screws. An oil-resistant soft rubber gasket, located in a groove in the ring, is provided. Being in compression when the wing nuts are screwed up, it ensures a tight joint, proof against the entry of moisture. A skirt is formed on the lower circumference of the body so that any water that may collect on the outside of the fitting will drip clear instead of trickling on to the glass.

The fitting is arranged to take a 150-W. or 200-W. tungsten filament lamp. For this purpose the lampholder is mounted on a bridge piece that may be placed in either of two positions, one of which is lower than the other, so that the same position of the filament relative to the reflector and bottom glass is preserved with a 150-W. lamp as when the 200-W. size is used.

An anti-condensation shield is provided immediately above the lampholder; it is secured to the lampholder bridge-piece by a central fixing, and being free to rotate, does not hinder the movement of the lampholder to the alternative position mentioned. The total weight of the fitting, excluding lamp, is 15¾ lb.

The lighting of the shed with the new fittings is adequate for normal inspection and maintenance of locomotives between their turns of duty, but supplementary local lighting from fluorescent lamps mounted on trolleys designed for easy mobility between the roads may be used to facilitate examination of small components, as described in our March 24, 1950, issue.

Southampton Ocean Terminal Lighting

Customs examinations hall, Southampton Ocean Terminal, British Railways, showing fluorescent lighting fittings supplied by the British Thomson-Houston Co. Ltd. (*See also our issue of August 4*)

Transport Users Consultative Committees

Establishment of Area Committees

Under the provisions of Section 6 of the Transport Act, 1947, the Minister of Transport has already established a Central Transport Consultative Committee for Great Britain, and Transport Users Consultative Committees for Scotland, Wales, and the London Area.

The Minister has now determined that Transport Users Consultative Committees covering the remaining parts of England shall be set up for the following areas:—

North Eastern: Northumberland, Durham, and the North Riding of Yorkshire.
Yorkshire: East and West Ridings and the City of York.
East Midlands: Derbyshire (except the Glossop area), Nottinghamshire, Leicestershire, Rutland, Northamptonshire, Oxfordshire, and Buckinghamshire.
West Midlands: Staffordshire, Shropshire, Worcestershire, Herefordshire, and Warwickshire.
South West: Gloucestershire, Wiltshire, Somersetshire, Devonshire, and Cornwall.
North West: Cheshire, Lancashire, Cumberland, Westmorland, and the Glossop area of Derbyshire.
South East: Berkshire, Hampshire, Dorsetshire, Sussex, Surrey, and Kent.
East Anglia: Lincolnshire, Norfolk Suffolk, Huntingdonshire, Cambridgeshire, Bedfordshire, Hertfordshire, and Essex.

Parts of Buckinghamshire, Surrey, Kent, Hertfordshire, and Essex are already included in the London area, and only those parts not so included will be covered by the new committees.

The area committees will be composed of an independent chairman and members representive of agriculture, commerce, industry, shipping, labour, and local authorities, and the British Transport Commission (who will be appointed after consultation with bodies representative of these interests), together with independent members selected by the Minister.

The committees, which will be concerned with both passenger and goods traffic, will consider any matters affecting the services provided by the British Transport Commission in their areas. In particular, they must consider any matters which may arise from representations by users of these services or which are referred to the committees by the Minister or the Commission. The recommendations or conclusions of the committees will be sent to the Central Transport Consultative Committee for Great Britain and to the Commission.

Institute of Transport Awards

The Council of the Institute of Transport has approved the following awards for papers submitted during the 1949-50 session:—

The Institute Award of Merit to Sir Eustace Missenden, Chairman of the Railway Executive, for his paper on "Some Thoughts on Railway Motive Power." (This award is presented not more frequently than once in three years in recognition of a conspicuous contribution.)

British Transport Commission Awards: (1) to Mr. D. S. M. Barrie, Public Relations Officer, Railway Executive, for his paper on "Railway Public Relations"; (2) to Mr. J. R. Pike, Chief Rates & Charges Officer, Railway Executive, for his paper on "The Co-ordination of Freight Transport Rates."

B.E.T. Road Passenger Transport Award to Mr. G. M. Newberry, trainee under the British Electric Traction Associated Omnibus Companies Training Scheme, for his paper on "Fares Calculations on Stage Carriage Services."

Road Transport (Passenger) Medal to Mr. W. G. Crosland-Taylor, General Manager, Crosville Motor Services Limited, for his paper on "Thirty Years' Progress in the Management of a Bus Company."

Institute 1944 Award to Mr. A. S. Yarnold, British Road Services (Pickfords Limited), for his paper on "Operational Control of a Parcels Depot."

Institute Graduate Award to Mr. M. Ormerod, Transportation Manager, Overseas Food Corporation, for his paper on "The Transport Problems of the East African Groundnut Scheme."

Institute Student Award to Mr. H. P. B. Betlem, Research Information Division, British Transport Commission, for his paper on "International Railway Problems."

Bristol & White-Smith Air Transport Student Prize to Captain H. K. Gordon-Burge, Pilot, Aer Lingus, for his paper on "A Critical Analysis of Post-War Airline Accidents."

"Modern Transport" Award to Mr. T. Humphreys, British Railways, London Midland Region, for his paper on "The Diagramming of Locomotives and Enginemen."

The following awards in respect of successes at the Institute examinations held in 1950 have also been approved by the Council:—

Associate Membership Examination: Prize for the most outstanding performance to Mr. J. Harris, Lancashire United Transport & Power Co. Ltd.; prize for the performance next in order of merit to Mr. A. Campbell, Glasgow Corporation Transport.

Graduateship Examination: Prize for the most outstanding performance to Mr. R. A. Palmer, British Railways (North Eastern Region); prize for the performance next in order of merit to Mr. W. J. Burness, G. J. Lofts, Limited (Dartford).

Presentation to Scottish Region Permanent Way Ganger

Mr. T. F. Cameron, Chief Regional Officer, British Railways, Scottish Region, presenting a cheque and the Railway Executive Certificate of Courage to Mr. A. Moffat, Permanent Way Ganger, for his bravery on the occasion of an outbreak of fire on the 11 p.m. Birmingham-Glasgow train on June 8, as recorded in our issue of June 16

Left to right are: Messrs. H. G. Sayers, Operating Department; T. H. Moffat, Deputy Chief Regional Officer; T. F. Cameron; A. Moffat; W. Y. Sandeman, Civil Engineer

Expansion of German Railcar Service

Measures devised by the German Federal Railways to meet growing road competition include large-scale expansion of the diesel railcar services, taking advantage of their high speed and flexibility. The building of new diesel railcars is in hand, pointing to the probability of the scheme becoming effective on the introduction of the 1951-1952 timetable next spring.

The scheme calls for railcar services with a total mileage of 11,178 miles, compared with the 4,347 miles covered by the present diesel railcars. The expansion of the diesel services will enable the present mileage covered by steam-operated long-distance fast trains to be reduced by 4,347 miles. In general it appears that steam-operated long-distance expresses are to be retained only for international services.

In addition to the increased number of diesel railcars a large number of railbuses of the type now in experimental operation on a few lines in the Hamburg and Augsburg management regions will be placed in service. In addition to stopping at stations, these railbuses will stop at convenient level crossings.

High-speed railcars, attaining 62 to 68 m.p.h., will convey second class only and will call at a few intermediate stations only. Passengers travelling by these railcars will be exempt from the extra charge now payable on long-distance fast trains. The three-unit railcar sets to be placed in service will have seating accommodation for 108 passengers, plus 30 seats in the restaurant compartment. Twelve high-speed railcars are now being built and nine railcars of an older series are being reconstructed and modernised. Of these 21 railcars, 14 will be placed in service continually, and seven kept in reserve as replacements or to cope with additional requirements.

Goods railcars are also to be placed in service soon. Their speed will equal that of steam-operated, long-distance fast goods trains. In addition, it is stated that a large number of diesel locomotives is to be introduced mainly to accelerate heavy goods trains.

With the large-scale introduction of the diesel services the operation of semi-fast trains, known as *Eilzüge*, is to be discontinued. These trains are to be replaced by high-speed inter-city trains operating between the most important traffic centres. No extra charge will be payable by passengers using them.

Staff & Labour Matters

N.U.R. Wage Claim Award

The Railway Staff National Tribunal, on August 15, ruled regarding the N.U.R. claim for lower-paid railwaymen, that the Railway Executive implement its offer made on July 7 (mentioned in our July 14 issue), the increases to take effect from the beginning of the first full pay period after September 1, 1950.

Engineers' Pay Dispute

Representatives of 37 unions incorporated in the C.S.E.U. met on August 10 to consider steps to be taken to press their claim. They decided that four delegates should have informal talks with the employers to negotiate terms as a basis for fresh discussions; delegates have been asked to report progress to another meeting of the C.S.E.U. Executive Council before taking further action.

Notes and News

Engineer Required by Bearing Manufacturers.—There is a vacancy for an engineer with railway experience as assistant to the head of the railway engineering division of a firm of anti-friction bearing manufacturers. See Official Notices on page 195.

Railway Materials for Argentina.—Purchases of railway materials in Britain, estimated at £2 million, are authorised in a Decree published on August 14 by the Argentine Ministry of Transport. The Decree, which allocates 30,786,000 pesos for the purchases, guarantees transfer funds at an exchange to be fixed by the Central Bank.

George Cohen, Sons & Co. Ltd.—The group profits of George Cohen, Sons & Co. Ltd. for the year ended March 31 last were £129,369, as compared with £216,158, after crediting £13,757 from previous years and charging £223,229 for tax. Payment of a final ordinary dividend of 12 per cent. brings the total for the year to 20 per cent., as last year.

New Line Opened in Tanganyika.—The first engine and wagons to reach the Mpanda lead mine along the newly constructed railway from the Tanganyika Central line at Kaliua arrived at Mpanda on August 10. The new line is expected to be in use within the next two weeks. While the new line will only affect Uruwira Minerals' mine at present, a few miles south of Mpanda the Union Corporation is prospecting over a large area. This part of Western Tanganyika is a potentially rich mineral area still completely undeveloped, except for the Mpanda mine.

Wagon Repairs Limited.—Sir Leslie Boyce, Chairman, presiding at the annual general meeting of Wagon Repairs Limited, said that the profit of the group for the year ended March 31, 1950, after making provision for depreciation and taxation, was £151,873. The profit of the parent company was £135,398, to which figure has to be added £23,650, being net dividends received from subsidiary companies. The balance sheet shows current assets as £986,987 in excess of liabilities as compared with £842,030 last year. In the past year there had been an urgent demand for more coal-carrying wagons and the wagon-repairing industry had been called on to give a higher output to increase the availability of wagons by reducing the number awaiting repairs.

Central Line Jubilee.—Lord Latham, Chairman of the London Transport Executive, recently gave a party to more than 100 members of the Central Line staff, this being part of the celebrations arranged in connection with the jubilee of the line, which was referred to in an editorial note in our July 21 issue. The photograph reproduced below shows Lord Latham greeting Mr. Charles Hewitt, aged 79 years, who drove the crimson and gold Royal Train at the opening of the first section of the "Twopenny Tube" from Shepherds Bush to the Bank in 1900.

Heavy Haulage & Machinery Carriers' Group.—Conditions of membership of the heavy haulage group of the Road Haulage Association have now been widened to admit members who carry machinery and provide the necessary facilities for loading and off-loading. From now on the group will be called the Heavy Haulage & Machinery Carriers' Group.

Argentine Tax Legislation.—A new bill which has the effect of raising most taxes was adopted by the Argentine Senate on August 10, becoming law on its enactment next day by the Chamber of Deputies. Under the bill, foreign companies will pay

Lord Latham, Chairman, London Transport Executive, with Mr. Charles Hewitt, who drove the first train on the Central London Railway (see paragraph above)

a higher profits tax than Argentine companies, paying 30 per cent. as from January 1, as against 24 per cent. for Argentine firms. The old rate was 18 per cent. of annual profit for all concerns, to which a further 6 per cent. was added if profits were remitted abroad.

Head, Wrightson & Co. Ltd.—The group net profit of Head, Wrightson & Co. Ltd. for the year ended April 30 last amounted to £248,316, against £220,828 last year, after allowing £301,285 for taxes. A final dividend of 6 per cent. in the ordinary shares was recommended, making an unchanged total for the year of 10 per cent., with capital increased by a 25 per cent. share bonus.

Locomotive Named "Sir Vincent Raven."—At a ceremony in Darlington on August 3, British Railways "A1" class Pacific locomotive No. 60126 was named *Sir Vincent Raven*, Chief Mechanical Engineer of the North Eastern Railway from 1910 to 1922. The ceremony was performed by Councillor G. Dougill, Mayor of Darlington, who was introduced by Mr. H. A. Short, Chief Regional Officer, North Eastern Region. Among those who accepted invitations to the naming ceremony were the following:—

Messrs. H. Dodsworth, Secretary, Robert Stephenson & Hawthorns, Limited; J. L. Meadowcroft, Area Superintendent, Eastern Area, Hotels Executive; and the following officers of the North Eastern Region: Messrs. B. X. Jessop, Assistant Chief Regional Officer; F. H. Petty, Motive Power Superintendent; J. Taylor Thompson, Civil Engineer; G. Tunbridge, Estate Surveyor; Dr. R. Fraser MacKenzie, Regional Medical Officer; Messrs. S. W. Jesper, Public Relations & Publicity Officer; G. C. Gold, Assistant Mechanical & Electrical Engineer; C. P. Parker, District Engineer, Darlington; I. G. MacGregor, District Operating Superintendent, Darlington; A. R. Jefferson, District Motive Power Superintendent, Darlington; C. Corps, District Commercial Superintendent, Middlesbrough; C. R. Hinds, Locomotive Works Manager, Darlington; S. L. Baister, Wagon Works Manager, Faverdale, Darlington; J. E. Lockey, Works Accountant, Darlington.

On the footplate of "A1" Pacific locomotive "Sir Vincent Raven" at the naming ceremony on August 3. Left to right are: Councillor M. Lyonette; Peter Iremonger, great-grandson of Sir Vincent Raven; the Mayor of Darlington; and Mr. H. A. Short, Chief Regional Officer, North Eastern Region

Aer Lingus Loss Reduced.—A net loss of £16,996 for 1949-50 is announced by Aer Lingus. Last year the loss was £162,850. Passengers numbered 199,023, an increase of 19 per cent., and gross operating revenue, at £1,142,617, was up by more than £67,000.

Customs Examination Hall at Dover.—An additional Customs examination hall is now in operation near the Admiralty pier at Dover to deal with the record number of motorists taking their cars to and returning from the Continent. The new hall has been built by British Railways and can accommodate ten cars at a time as compared with six cars in the existing hall. It is laid out in such a way that the Customs officials and the A.A. and R.A.C. representatives can clear cars at the rate of one a minute. A total of 85 cars in a ship from Boulogne were cleared in 80 minutes.

Permanent Way Institution (Irish Section).—A meeting of the Irish Section of the Permanent Way Institution was held at Limerick recently when a paper on "Discharging and Relaying with 60-ft. B.H. Rails and Prestressed Concrete Sleepers by Hand" was read by Mr. J. Wilson. Another paper dealing with curved track was read by Mr. J. Cornally. Members also inspected relaying work in the level crossing carrying the Limerick-Waterford branch across the Dublin-Cork lines where cast-manganese crossings are being used.

Canadian Pacific Dividend.—At a meeting of the board of the C.P.R. on August 14, a dividend of 2 per cent. (fifty cents a share) on the ordinary capital stock in respect of 1950 was declared payable in Canadian funds on October 2. Net earnings from railway operations for the six months ending June 30, though showing a substantial improvement over the corresponding period of last year, are still insufficient for the paying of any dividend. While hopeful that better results may be achieved in the second half of the year the directors point out that the dividend now declared is attributable solely to income from other sources.

Italian Railway Equipment for Greece.—Further to the paragraph on page 93 of our July 28 issue, we are informed that the Societa Italiana Ernesto Breda, Milan, is also supplying 14 railcars for the Thessaly Railways, and ten steam locomotives and spares for the Piræus-Athens-Peloponnesus Railway.

U.S.A. Locomotive Firms Plan Consolidation.—An agency report from New York states that consolidation of the Baldwin Locomotive Works Inc. and the Lima-Hamilton Corporation has been approved in substance by directors of the two firms. The new organisation, which will be known as Baldwin-Lima-Hamilton Corporation, will have assets valued at $120 million.

Leeds Purchases London Trams.—Leeds City Corporation Transport Department has recently purchased 92 trams from the London Transport Executive at a cost of £500 each. The trams will be used to replace old stock ready for scrapping. The purchase indicates that the corporation probably intends to operate trams for a number of years to come. Only one of the London tramcars has been delivered so far.

London to Edinburgh Air Service.—A new air service between London and Edinburgh was inaugurated on August 15 when a Vickers Viscount airscrew-turbine aircraft completed the 330-mile flight from Northolt Airport to Turnhouse in 1 hr. 52 min. The aircraft will make one return trip daily between London and Edinburgh for the next week with the primary object of taking visitors to the Edinburgh Festival.

Electric Locomotives for S.N.C.F.—In an article in our issue of July 14, which described the improved design of 2-Do-2 electric locomotives for the S.N.C.F., there was a reference to the S.K.F. roller bearings fitted to the axles of the guiding bogies. We have been informed that the four driving axles are fitted with eight inside axleboxes of the Athermos type made by the Société Generale Isothermos, of Paris.

Scottish Machine Tool Corporation Ltd.—In his statement at the annual general meeting of Scottish Machine Tool Corporation, Mr. J. P. Reynolds, Chairman & Managing Director, said that the directors were satisfied with the results for the year and were pleased to report that the order book had been maintained at a high level with slightly more than 50 per cent. of the orders being for overseas customers. Profit for the year ended March 31 last amounted to £96,682, an increase of £7,308 over the previous year, and, after deduction of £62,000 for tax the balance available was £34,682. A final dividend of 5 per cent. was agreed, making, with the interim dividend of 3 per cent., 8 per cent., less income tax for the year.

U.S.A. Strike Threat.—Railway union officials have urged President Truman to take over the railways after negotiations to prevent a national railway strike which ended on August 15 without agreement. The request was made by Mr. W. P. Kennedy, President of the Brotherhood of Railroad Trainmen, and Mr. R. O. Hughes.

OFFICIAL NOTICES

President of the Order of Railway Conductors, who said that such action was necessary to avoid a nation-wide strike. Mr. John R. Steelman, assistant to President Truman, who has been mediating in the dispute, said that representatives of the employers and unions had agreed to remain in Washington if he could find a basis for reopening negotiations. The unions are demanding a 40-hr. week without loss of pay for some 300,000 of their members who are still working on a 48-hr. week.

North Eastern "Beaches and Lights" Specials.—From January to the end of July the North Eastern Region of British Railways ran 725 special trains carrying 217,527 adults and 36,252 children to seaside resorts. A further 385 more special trains are planned for August and September, the majority of which will serve Morecambe, Blackpool, Sunderland, and Seaburn during the "illuminations."

British Power Plant for South Africa.—The Electricity Supply Commission of South Africa announced in London on August 15 that Britain would get the major part of a £54 million order for plant and equipment to expand power supply in South Africa. One new power station at Worcester will provide for the electrification of a further stretch of the main railway line between Capetown and Kimberley.

Market Harborough Inland Waterways Festival.—Sir Reginald Hill, Chairman of the Docks & Inland Waterways Executive, attended the Market Harborough Festival and Rally of Boats on August 17, and met representatives of the Inland Waterways Association on board the inspection launch *Kingfisher*. The carrying fleet of British Waterways was represented at the rally by a pair of boats which operate on the London-Birmingham route.

Aluminium Sheeting Display Exhibits.—Products of the Waterproofing Co. Ltd. on view at the Commercial Motor Transport Exhibition at Earls Court from September 22-30 will comprise Alhambrinal decoration aluminium sheeting, displayed in section panels. This firm will also be represented in the ceiling and body panels of a Bournemouth Corporation trolleybus on the Metro-Cammell Weymann stand, in bus and motorcoach bodies built by H. V. Burlingham Limited, and in a coach body on Guy chassis built by Walter Alexander & Co. Ltd.

Further Closing of Ulster Branch Lines.—The Ulster Transport Authority announces withdrawal of services as from August 28 on the Cookstown branch and Derry Central line. On the lines from Cookstown Junction to Cookstown and from Magherafelt to Kilrea passenger services will be withdrawn, but goods services will be continued; the section from Kilrea to Macfin will be closed to both passenger and goods traffic. Alternative road and road-rail services will be provided. Reference to the recent closing of other former L.M.S.R. (N.C.C.) branches was made in our June 30, July 7, and August 11 issues.

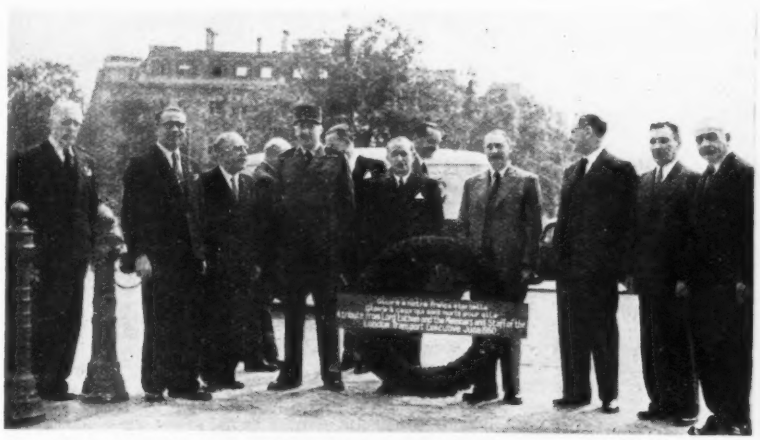
Laycock Engineering Exhibits at Earls Court.—Products of the Laycock Engineering Co. Ltd. displayed at Earls Court at the Commercial Motor Exhibition (September 22-30) and the International Motor Exhibition (October 18-28) will include an overdrive unit shown mounted to a gearbox; a Layrub coupling, demonstrated with a power-operated fixture; Laycock-Neale air brakes (at the Commercial Motor Exhibition only); Laycock-Sprague pneumatic accessories; Air Push windscreen wiper; Pelton moisture ejector valve; plastic mouldings; and a Layrub flexible clutch centre.

Trolleybus Equipment.—At the Commercial Motor Transport Exhibition, to be held at Earls Court from September 22-30, The English Electric Co. Ltd. will be exhibiting examples of trolleybus equipment. These will include a driver's seat, supplied by A. W. Chapman Limited, Ranelagh Gardens, London, S.W.6, demonstrating controller, contactors, and other parts; and also a main trolleybus motor, type EE 410/4, of 120 h.p. at the one-hr. rating, used on British trolleybus routes. Exhibits of auxiliary equipment will show the compressor motor with its component parts opened up for inspection; a complete compressor built by the Westinghouse Brake Company and driven by a type 727 motor; and contactors. Apart from this stand, trolleybus equipment will be seen in a Newcastle Corporation bus on the British United Traction stand and among the exhibits of Park Royal Vehicles Limited.

British Railways Band in National Finals.—When the British Railways Shildon Band, Durham, became the runner-up for the *Daily Herald* Northern Area Championship of the second section at Newcastle last March it also qualified for the National Brass Band finals which take place at Belle Vue, Manchester, on September 23. Then the band will bid for the national title of its class against seven other area events in a contest of 15 bands. The Shildon Band, which is the only railways band in the finals, celebrates its centenary this year.

Westinghouse Products at the Commercial Motor Exhibition.—Working exhibits of compressed air brake equipment by the Westinghouse Brake & Signal Co. Ltd. at the Commercial Motor Exhibition at Earls Court, on September 22-30, will comprise: a bus and coach brake with compressor driven from engine or transmission; a trolleybus brake incorporating an electri-

Paris Metropolitan Jubilee



Wreath laid on the tomb of the Unknown Warrior in Paris by Lord Latham, Chairman of the London Transport Executive, who is seen in centre with Monsieur Georges Ricroch, President of the Régie Autonome des Transports Parisiens, during the 50th anniversary celebrations of the Paris Metropolitan Railway (see paragraph in August 11 issue)

cally-driven compressor with air-operated switch for the motor to regulate pressure in the reservoir; single-pipe trailer brake for tractors and trailers with only one line between the vehicles; a simplified goods vehicle brake; and pneumatic door equipment. There will also be shown air compressors, control valve assemblies, slack adjusters, brake cylinders, and other parts for road vehicle brakes.

Industrial Finishes Exhibition.—Among the products to be shown by the firm of Jenson & Nicholson Limited at the Industrial Finishes Exhibition at Earls Court from August 30 to September 8, will be a model refrigerator illustrating the application of Jensolac stoving enamels for use in the sheet-metal industries and general engineering trades. The electrical industry will be symbolised by a model heavy-duty motor, showing Solventless, Coilac, and Lacwatt insulating and impregnating varnishes, in addition. Details of Lacwatt impregnating varnish for enamelled wire and Mafinel machine enamels for casings will also be shown.

Open Day at Eastleigh Works.—Railway enthusiasts had an opportunity on Wednesday of seeing what "makes the wheels go round" when the Southern Region Locomotive & Carriage Works at Eastleigh were open to visitors. Locomotives, including the latest "Merchant Navy," "West Country," and "Battle of Britain" classes, undergoing repair and overhaul, were on view in all stages, from component parts to the complete engine. Visitors were shown the most modern wheel shop in the country, the continuous casting plant, and many other modern developments, as well as some British Railways rolling stock in course of construction. Excursions to Eastleigh were run from Waterloo and other stations.

Display of Laminated Plastics.—At the Industrial Finishes Exhibition at Earls Court from August 30 to September 7, Warerite Limited will exhibit five wall panels to illustrate applications for laminated plastics. These materials are solid homogeneous panels or veneers with an attractive patterned or coloured surface. Because the patterns and colours are an integral part of the sheet, the use of Warerite plastics for lining walls, flush doors, covering tables, counters and furniture in ships, trains, hotels, restaurants, buildings, and so on, eliminates the necessity for painting on installation as well as the heavy cost of redecoration wherever they have been installed.

Forthcoming Meetings

Until August 19 (*Sat.*).—The Model Engineer Exhibition, at New Horticultural Hall, Vincent Square, London, S.W.1.

August 19 (*Sat.*).—Permanent Way Institution, Manchester & Liverpool Section, at the Temperance Institute, 65, London Street, Southport, at 2.30 p.m. Discussion: "Theory *versus* Practice."

August 24 (*Thu.*) to 28 (*Mon.*).—Railway Students' Association, London School of Economics & Political Science. Annual Convention at Lenton Firs Hall of Residence, Nottingham.

September 2 (*Sat.*).—Irish Railway Record Society. Visit to Dundalk, Newry & Greenore Railway.

September 2 (*Sat.*) & 3 (*Sun.*).—Royal Engineers (Transportation) Public Day and Reunion, at the Transportation Centre, Royal Engineers, Longmoor Camp, Liss, Hants.

Railway Stock Market

Helped by a rally in British Funds, accompanied by reports that further Colonial issues may be made on the London market before long, which would be an indication of confidence, markets generally have been firmer and slightly more active. Emphasis was again on rearmament and allied shares, among which the best feature has been a general rise in shares of locomotive building and allied companies. Iron and steels, such as Guest Keen, United Steel, and Dorman Long, attracted a little profit-taking after their recent rise, and in general buying of industrial shares was again very selective. This is not surprising in view of the prospect of higher taxation. In existing circumstances it is regarded as unlikely that Sir Stafford Cripps will relax his dividend limitation request. Indeed it is thought not improbable in some quarters that if there were any general tendency to pay higher dividends the Government might decide to bring in legislation to limit them.

Foreign rails attracted only limited attention. San Paulo 10s. units declined sharply to 14s. 3d. following the annual report and statement which indicate that it may be a long while before the additional compensation claims are finally settled. Nevertheless it is believed in some quarters that when there is a settlement, and assuming it is on a reasonably fair basis, the 10s. units might prove to be worth around 20s. It is clear, however, that they may now have to be regarded more as a long than a short-term holding.

United of Havana stocks have continued to fluctuate erratically. After the recent rumour of pending fresh take-over developments, which lifted prices sharply, the 1906 debentures, for instance, have reacted to 16. Leopoldina stocks tended to be affected by the San Paulo annual report, although there seems no reason to expect any lengthy delay in paying the compensation money. Indeed, it is hoped that "pay-outs" for the various stocks may be made before the end of the year, and they seem likely to be above current market prices. Leopoldina ordinary changed hands around 9, the preference was 25, and the 4 per cent. debentures 93, while the 6½ per cent. debentures receded to 130. Leopoldina Terminal debentures were back to 85; the ordinary units changed hands around 1s. 3d. Antofagasta stocks held their recent improvement, the ordinary being 7½, and the preference 44xd. Brazil Rail gold bonds receded to 40, but in other directions Great Western of Brazil kept steady at 150s. Canadian Pacifics eased, but later firmed up to 30⅝ on satisfaction with the maintained interim dividend. Nitrate Rails were better at 75s. Manila "A" debentures were 60 and the preference shares 6s. 3d. French railway sterling bonds eased with Midi and Orleans both at 93¼.

Firmness again ruled among road transport shares, and in some cases they remained so tightly held that buyers found it difficult to buy at prices indicated by current quotations. Southdown were 112s. 6d., West Riding 61s., and Lancashire Transport 77s. B.E.T. deferred stock has eased to 430 at the time of writing.

Among shares of locomotive builders and engineers, prices have rallied all round, buying finding the market none too well supplied with stock. Vulcans advanced to 22s. 3d., Beyer Peacock were 22s. 6d., North British Locomotive 18s. 10½d., and Gloucester Wagon 61s. 3d., but Wagon Repairs 5s. shares eased to 16s. and T. W. Ward to 64s. 3d. Birmingham Wagon were 30s. 6d., and at Glasgow, Hurst Nelson were 56s. 6d. There was a little profit-taking in steel shares, mainly because of wider realisation that companies scheduled for nationalisation are precluded from increasing their dividends until the question of State control is finally settled. Nevertheless yields on the basis of last year's dividends are attractive.

HEAVY DEMAND FOR B.I.F. SPACE.—Record demands are reported for space at the 1951 British Industries Fair to be held in London at Earls Court and Olympia and in Birmingham at Castle Bromwich from April 30 to May 11. The response to application forms for space indicates that this will be the largest and most comprehensive trade fair ever organised in Britain. The forms were sent out in July and by the end of July twice as much space had been applied for as at the corresponding period for any previous fair.

Traffic Table of Overseas and Foreign Railways

	Railway	Miles open	Week ended	Traffics for week: Total this year	Traffics for week: Inc. or dec. compared with 1948/49	No. of week	Aggregate traffics to date: Total 1949/50	Aggregate traffics to date: Increase or decrease
				£	£		£	£
South & Central America	Antofagasta ...	811	6.8.50	68,880 +	9,200	31	1,887,554 —	173,400
	Costa Rica ...	281	May, 1950	c1,034,427 —	c46,785	48	c9,483,848 —	c1,726,592
	Dorada	70	June, 1950	23,781 +	2,219	26	231,172 +	60,567
	Inter. Ctl. Amer. ...	794	June, 1950	$1,116,431 —	$25,456	26	$7,031,230 +	$440,715
	La Guaira	22¼	July, 1950	$79,716 —	$20,386	30	$583,033 —	$168,584
	Nitrate	382	31.7.50	20,099 +	14,869	30	275,520 +	14,869
	Paraguay Cent. ...	274	28.7.50	£174,095 +	£38,542	4	£771,092 +	£194,303
	Peru Corp. ...	1,050	July, 1950	$7,475,000 +	$2,860,550	4	$7,475,000 +	$2,860,550
	,, (Bolivian Section)	66	June, 1950	Bs. 4,067,000 —	Bs. 3,531,834	52	Bs. 110,749,664 +	Bs. 7,004,480
	Salvador	100	Apr., 1950	c148,000 —	c34,000	43	c1,624,000 —	c166,000
	Taltal	154	July, 1950	$1,231,909 +	$151,518	4	$1,231,909 +	$151,518
Canada	Canadian National†	23,473	June, 1950	15,923,000 +	2,393,000	26	85,318,000 +	6,393,000
	Canadian Pacific† ...	17,037	June, 1950	10,774,000 +	1,085,000	26	59,102,000 +	690,000
Various	Barsi Light* ...	167	June, 1950	30,675 +	6,502	13	90,937 —	2,242
	Egyptian Delta ...	607	30.6.50	13,840 —	2,667	13	151,431 —	17,513
	Gold Coast ...	536	June, 1950	253,988 +	2,962	13	738,850 +	33,073
	Mid. of W. Australia	277	May, 1950	36,409 +	5,286	48	345,258 +	23,758
	Nigeria	1,900	Jan., 1950	502,360 +	38,978	44	5,017,814 +	266,573
	South Africa ...	13,347	22.7.50	1,656,479 +	114,685	18	25,821,320 +	2,088,477
	Victoria	4,744	Apr., 1950	1,721,471 +	276,573	44	—	—

* Receipts are calculated at 1s. 6d. to the rupee

† Calculated at $3 to £1